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PRAIRIE ISLAND NUCLEAR GENERATING PLANT
ENVIRONMENTAL MONITORING PROGRAM
1976 ANNUAL REPORT
ECOLOGICAL STUDIES

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1976 PROGRESS REPORT ON THE PRAIRIE ISLAND
FISH POPULATION STUDY
(2.5.2)

Prepared for
Northern States Power Company
Minneapolis, Minnesota

by
Scott P. Gustafson
and
Joseph L. Geis

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Minnesota Department of Natural Resources
Division of Fish and Wildlife
Ecological Services Section
June, 1977

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2.5.2.1 Introduction

This study is part of a continuing comprehensive investigation by various consultants to determine environmental effects of the Prairie Island Nuclear Generating Plant (PINGP) near Red Wing, Minnesota. The purpose of this study is to determine effects of the plant on fish populations in the Mississippi River and its backwaters near Red Wing, Minnesota.

Several parameters were used to measure changes in the population which might be related to plant operation. These parameters include population structure (e.g., abundance, species composition), fish movements, condition, and growth. Changes in environmental conditions should be reflected in these parameters.

2.5.2.1.1 Scope

The total study includes a fish population study and a creel survey; this progress report deals only with the fish population study. The report describes field work carried out in 1976 and analyzes data collected. The dates of the regular sampling seasons in 1976 were: spring, May 26-July 21; summer, July 27-September 1; and fall, September 14-October 28.

2.5.2.1.2 Study Area

The five sections of the study area (Figure 2.5.2-1) are described by Hawkinson (1974). Each section or area consists of 10 numbered stations beginning with zero at the upstream end and ending with

nine at the downstream station. Sampling is done at designated sites within the stations to eliminate any sampling bias which might result if different sites within the station were sampled in different seasons or years. However, water stage influences the distribution of fish and may result in some differences in catch between seasons or during the same season in different years. Figures 2.5.2-2 through 2.5.2-5 indicate all original sampling sites for each type of gear. Some of these sampling sites are no longer used (see Materials and Methods section).

2.5.2.2 Materials and Methods

2.5.2.2.1 Gear

Fish were collected using five types of sampling gear; trap net, gill net, electro-fisher (boom shocker), trawl, and seine to monitor the abundance, condition, and age structure of fish in the vicinity of the Prairie Island Plant. An illustration of each type of gear can be found in Naplin and Geis (1975). A list of common and scientific names and methods of capture of fish in the area of Prairie Island Nuclear Generating Plant in 1975 is presented in Table 2.5.2-1. This table also lists previous years in which each species was captured.

2.5.2.2.1.1 Trap Netting

As in 1975, river trap nets, described by Krosch (1967), were set for four nominal 24-hour sets at each of four stations in Sections 0 and 4 and at each of five stations in Sections 1 and 3. As in previous years, no trap nets were set in Section 2 because of swift currents and heavy barge traffic. A 10-pound

anchor was attached to the front frame of trap nets set in the main channel in Sections 3 and 4 to reduce the incidence of net-rolling. In a few instances the extra anchors did not prevent nets from rolling, so nets were held in place by stakes pounded into the bottom alongside the front frame. Catch data from nominal 24-hour sets in which the net did not fish properly were not used in calculations.

Table 2.5.2-2 lists stations that were trap netted in 1975 and 1976. Beginning in 1975, the trap netting procedure was changed from one nominal 24-hour set at each station in Sections 0, 1, 3, and 4 during each sampling season in 1973 and 1974, to four nominal 24-hour sets per season at selected stations in each section. Multiple sets at each station reduce catch bias that may result from weather or water conditions when only one set per station per season is made. This procedure also increased the number of sets per section during each sampling season from 10 to 16 in Sections 0 and 4 and from 10 to 20 in Sections 1 and 3.

2.5.2.2.1.2 Gill Netting

Standard 250 x 6 foot experimental gill nets were used in Sections 0, 1, and 3. Eight nominal 24-hour sets were made in each section by making two nominal 24-hour sets at four stations. As with trap nets, the number of gill net stations was reduced with multiple settings at each station so more reliable data could be obtained. This procedure resulted in reducing the total number of all net sets per section from 10 in 1974 to eight in 1975 and 1976 (Table 2.5.2-2). Gill nets were used only during the spring and fall sampling seasons.

2.5.2.2.1.3 Electro-fishing

One 15-minute electro-fishing run was made in each station in each section during all three sampling seasons. All runs were conducted during daylight hours. The electro-fishing unit was the same used in previous years. Electrical output was regulated by adjusting engine rpm. An output range of 5.5 to 7.0 amperes was most productive; an attempt was made to maintain an output of 6.5 amperes.

2.5.2.2.1.4 Trawling

Trawling was done in the plant intake area, discharge canal, and two stations in North Lake as in 1974 and 1975. A minimum of 14 minutes of trawling, two 7-minute runs if possible, was completed in each station with the same trawl used in previous years.

2.5.2.2.1.5 Seining

Shoreline seining was done in all five sections and was restricted to areas with water depths of less than six feet using the same seine used in 1974 and 1975. The seine is 1/4-inch knotless nylon, 50 feet long by four feet deep, with a 4 x 4 x 4-foot bag. Each seine haul in 1976 covered approximately 400 square meters. This is almost one-third more area per haul than in 1975. Lower-than-normal water levels in 1976, particularly in spring, resulted in better conditions for seining. At many of the stations the area that could be waded, and thus seined, was larger due to lower water levels. In 1975, particularly during

the spring, many of the areas could not be seined because of high water levels.

2.5.2.2.2 Tagging

The tagging program initiated in 1974 was continued in 1976. Fish were tagged with Floy tags, a length of yellow vinyl tubing of approximately 1/16-inch diameter with a molded "T" shaped nylon anchor attached to one end. Tags are imprinted with the legend, MINN DNR ST PAUL F____, and serially numbered. Tags are applied with a special gun (described by Naplin and Geis 1975).

2.5.2.2.3 Scale Samples

Scale samples were taken during summer and fall sampling periods in 1976. Scale samples were aged to determine population age structure. It was estimated that a sample size of about 150 fish would be sufficient for determining population structure (Peterson, personal communication). Previous sampling data indicated that for some species this sample size could be collected with fish from a single type of gear. For other species a combination of all gear types was needed to get a large enough sample.

2.5.2.2.4 Ancillary Studies

2.5.2.2.4.1 Discharge Electro-fishing Study

An electro-fishing study was conducted in the intake and discharge area of PINGP to determine the effects of water tempera-

ture and habitat on fish species composition and abundance in the waters adjacent to the plant. Seven standardized five-minute electro-fishing runs were made on twelve separate dates from April 22 through November 19, 1976. The electro-fishing gear was the same AC electro-fishing unit used in the Prairie Island fish population study. As during regular sampling, the unit was operated in the 5.5-7.0 ampere range.

The seven electro-fishing runs (Figure 2.5.2-6) were chosen so the substrate and water temperatures would be relatively constant within a given run. Each run is described in Table 2.5.2-3.

Surface and bottom water temperatures were each recorded at the beginning, middle, and end of each sampling station. Temperatures were measured to the nearest 0.1°C either during the shocking run or immediately after the five-minute run was completed. A secchi disk reading was made at the beginning or end of the run.

Fish collected were identified and counted. When large numbers of minnows, small bluegills, or young-of-the-year gizzard shad were collected, a representative sample was measured and the remainder counted. Larger fish were measured and weighed. Fish were generally returned to the same area from which collected.

The study was conducted on days with fairly consistent climatic conditions to reduce sampling bias that may result from differential fish distribution due to weather conditions. Sampling was generally conducted on sunny days when barometric pressure was 756 mm or greater and steady or rising. The study was conducted between 0900 and 1600 hours on each sampling date.

The order in which the seven electro-fishing runs were sampled was varied. Beginning with the fourth sampling date, the order in which the runs were electro-fished was determined using a random number table.

Sampling was also conducted on December 15, 1976, but information from this day was not used because runs number 4, 6, and 7 were ice-covered.

A diversity index (\bar{d}) was calculated for each individual run. The following equation was used: $\bar{d} = \frac{C}{N} (N \log_{10} N - \sum n_i \log_{10} n_i)$ where C equals 3.321928 (converts base 10 logs to base 2 logs), where N is the total number of individuals, and n_i is the total number of individuals of the i^{th} species (Lloyd, Zar, Karr 1968, as cited by Weber 1973).

A mean diversity index (\bar{d}_s) was calculated for each station by summing \bar{d} 's for all the runs completed at a given station and dividing by the number of runs completed. Mean temperature for each run (\bar{t}_i) was calculated by summing the three pairs of surface and bottom temperatures and dividing by six. Mean temperature for each station (\bar{t}_s) for the season was calculated by summing the means for each run conducted at a given station and dividing by the number of runs at that station.

2.5.2.2.4.2 Population Estimate — Discharge Canal

A mark-recapture experiment was performed to estimate the numbers of fish attracted to the heated discharge of PINGP during late fall and winter. Fish from Stations 3-2 and 3-3 (Figure 2.5.2-7),

the discharge canal, were collected by electro-fishing on nine days from November 1 through December 8, 1976.

Stations 3-2 and 3-3 extend from the discharge gates of the plant to Barney's Point, about 680 m. downstream. These two stations are affected more by the heated discharge of the plant than the other stations. The combined surface area of these two stations is 6.30 ha (15.56 acres).

The two stations were divided into several areas and standardized electro-fishing runs established in these areas. Most runs were along shorelines, because electro-fishing gear is only effective to a depth of approximately 2 m.

Previous electro-fishing data from the discharge canal have indicated catch rates for game fish were generally higher near the discharge gates, so much of the sampling for this study was concentrated near the discharge gates. Substations 3-2-1, 3-2-2, and 3-2-4 were within 70 m. of the discharge gates (Figure 2.5.2-7). Substation 3-2-3 was along the riprap on the south side of the discharge canal from about 60 m. to 220 m. away from the discharge gates. Substation 3-3-1 extended along the eastern shore of Section 3-3. Substation 3-3-2 extended along the western shore of Section 3-3.

The electro-fishing gear consisted of an Onan 230-volt gas-powered generator. A Smith-Root type VI control panel was used to regulate the electric field. The anode was a ring of 1/2 inch stainless steel. Cathodes were steel cable trailing from each side of the boat. Output varied between 1.0 and 3.0 amperes with a pulse rate of 60 pulses per second.

A three-man crew did the shocking. Two people stood in the bow of the boat and netted fish, while the third crew member operated the control panel and the outboard motor.

As fish were netted, they were placed in a holding tank in the boat until they were measured and marked. The following seven species were marked with Floy tags or fin-clips: carp, channel catfish, white bass, smallmouth bass, largemouth bass, sauger, and walleye.

All sizes of carp collected were fin-clipped as were smallmouth bass less than 24.6 cm. Except for one day, when white bass between 21.8 and 24.9 cm were tagged with Floy tags, white bass less than 25.0 cm were fin-clipped. However, no recaptures were noted on young-of-the-year white bass, so fin-clipping of this age group was discontinued after November 11, 1976. Both fin-clipped and tagged white bass greater than 19.0 cm were used for population estimates.

All channel catfish, largemouth bass, sauger, and walleyes collected were large enough to be tagged. In addition, all white bass and smallmouth bass over 25.0 cm were marked with Floy tags.

All recaptures during sampling were recorded. A population estimate by species was made using the method of Schnabel (1938) as modified by Chapman (1952, 1954), and cited by Ricker (1975) using the following equation:

$$N = \frac{\sum (C_t M_t)}{R + 1}$$

Ricker (1975) defines these symbols as follows:

N = size of population at time of marking

M_t = total number of marked fish at large at the start of the t^{th} day (or other interval), i.e., the number previously marked less any accidentally killed at previous recapture

C_t = total sample taken on day t

R_t = number of recaptures in the sample C_t

$R = \sum R_t$ = total recaptures during the experiment.

A symbol not mentioned specifically by Ricker, but which is useful in tabulations such as Table 2.5.2-27, is M_i

M_i = number of fish tagged on day i .

Confidence limits (95 percent) were calculated for the population estimates. Poisson variables were used in constructing the confidence limits (Ricker 1975).

Mean length of white bass 19.0 cm or larger and of all walleyes and carp marked during the study were calculated; mean weights were calculated using fall length-weight regression for each species.

2.5.2.2.4.3 Temperature Monitoring

Water temperatures for Sturgeon Lake were recorded with a Temp-scribe recording thermograph placed along the northeast shore of Sturgeon Lake in Section 1-4, the same location used in previous years. Temperatures were recorded from April 14 through October 28, 1976. There were several short breaks in recording the data.

2.5.2.3 Results

2.5.2.3.1 Gear

2.5.2.3.1.1 Trap Netting

During 1976 a total of 5,745 fish representing 34 species were caught in 202 nominal 24-hour trap net sets. The total summer and fall catches were fairly consistent, but the spring catch was considerably lower. The average number of fish per lift was highest in the area above the plant during all three seasons. Tables 2.5.2-4 through 2.5.2-6 summarize trap net catches by area and season. Table 2.5.2-7 is a length-frequency of fish caught with trap nets during 1976.

Four species comprised over 68 percent of the total trap net catch: carp (22.7 percent), freshwater drum (22.5 percent), white bass (13.5 percent), and shorthead redhorse (9.4 percent). An additional 21.8 percent consisted of the following seven species, listed in order of abundance: black crappie, gizzard shad, white crappie, sauger, northern pike, walleye, and bluegill.

The total catch of carp by season was uniform, ranging from 427 to 446 fish. During spring and summer the highest catch rate for carp was in the plant area, while during the fall the area below Lock and Dam 3 had the highest catch rate. The catch rates for carp ranged from 3.42 to 9.19 fish per lift.

The catch of freshwater drum was lowest in the spring and highest in the summer with the fall catch about midway between. During each season the catch rate was highest in the plant area

(4.20 to 13.50 fish per lift) and lowest in the area below Lock and Dam 3 (1.67 to 3.69 fish per lift).

In all areas the catch rate of white bass was low in spring, increased during the summer, and was highest in the fall. The area above the plant had the highest catch rate during each season, ranging from 2.39 to 9.10 fish per lift. In the other areas, the catch rate ranged from 0.17 to 3.74 fish per lift.

The catch rate for shorthead redhorse was highest above the plant during all three seasons ranging from 1.86 to 5.64 fish per lift. For other areas, the number of fish per lift ranged from 0.17 to 2.32.

Catch rates of both saugers and walleyes were low in all areas during the 1976 trap netting. The catch rate for saugers ranged from 0.17 to 1.50 fish per lift and for walleyes from zero to 0.77.

2.5.2.3.1.2 Gill Netting

A total of 2,092 fish representing 30 species was caught in 48 nominal 24-hour gill net sets during 1976. Over 54 percent of the catch was made during spring gill netting. White bass comprised 25.4 percent and gizzard shad 22.8 percent of the total catch. Carp, white crappie, sauger, shorthead redhorse, short-nose gar, northern pike, black crappie, and walleye, listed in order of abundance, accounted for an additional 38.6 percent of the total catch. Table 2.5.2-8 summarizes gill net catches by area and season and Table 2.5.2-9 is a length-frequency of gill net-caught fish.

The catch rate for white bass was higher above the plant than in the plant area during both seasons. The fall catch rate above the plant was 27.31 fish per lift, over four times the spring catch rate in this area. Over 95 percent of the white bass caught during fall gill netting were young-of-the-year fish.

The catch rate of gizzard shad was highest in the spring above the plant (16.75 fish per lift), comprising over 56 percent of all gizzard shad gill netted. Most of these fish were yearling gizzard shad. The fall catch rate was fairly consistent above the plant and in the plant area. Low numbers of young-of-the-year gizzard shad were caught in fall 1976 gill netting compared with previous years.

Carp accounted for 9.4 percent of the total gill net catch. The catch rate of carp in spring was over 14 times higher above the plant and 10 times higher in the plant area than fall catches in the same areas. The catch rates ranged from 0.50 to 8.88 fish per lift.

With one exception, catch rates for white and black crappies in 1976 ranged from 0.19 to 2.69 fish per lift. In the plant area during the fall period, the catch rate of white crappies was 9.88 fish per lift.

Saugers comprised 5.8 percent of the total catch. Catch rates in both areas were higher in spring than fall. Spring catch rates were similar in both areas, but in fall, the catch rate in the plant area was twice as high as that above the plant. Sauger catch rates ranged from 1.25 to 3.63 fish per lift.

Catch rates of northern pike ranged from zero in the plant area in fall to 2.50 fish per lift in the plant area in spring. Northern pike comprised 3.5 percent of the gill net catch.

Walleyes accounted for 2.3 percent of the gill net catch. Catch rates in both areas were over five times higher in spring than fall. Walleye catch rates ranged from 0.13 to 2.06 fish per lift.

2.5.2.3.1.3 Electro-fishing

A total of 6,328 fish of 44 species was collected during 37.5 hours of day electro-fishing during 1976. Four species comprised almost 60 percent of the total catch: gizzard shad (19.0 percent), carp (14.3 percent), white bass (14.0 percent), and freshwater drum (15.2 percent). Six other species (listed in decreasing order of abundance) accounted for an additional 29.2 percent of the total catch: bluegill, emerald shiner, shorthead redhorse, walleye, smallmouth bass, and sauger.

Tables 2.5.3-10 to 2.5.3-12 summarize day electro-fishing catches by area and season. Table 2.5.3-13 is a length-frequency of all fish caught electro-fishing during 1976.

The catch rate for gizzard shad was higher in the plant area than other areas during each season. The catch rate for each area increased by over 18 fish per hour from summer to fall. During 1976 gizzard shad catch rates ranged from 4.80 to 86.80 fish per hour. Most of the gizzard shad collected were young-of-the-year.

The catch rate of carp in the plant area in spring (42.80 fish per hour) was over twice as high as in either of the other areas. During summer and fall the catch rate was highest below Lock and Dam 3, 40.00 fish per hour during both seasons. The area above the plant had the lowest catch rate during both seasons, 10.13 in the fall and 25.87 fish per hour during the summer.

The catch rate for white bass below Lock and Dam 3 was the highest of the three areas during all seasons, ranging from 33.20 to 54.80 fish per hour. During spring the white bass catch rate was lowest in the plant area (26.00 fish per hour). During summer and fall the catch rate was lowest above the plant, 15.47 and 8.53 fish per hour, respectively.

With two exceptions, electro-fishing catch rates for freshwater drum ranged from 2.08 to 9.20 fish per hour. During the summer catch rates in the plant area and above the plant were considerably higher, 47.20 and 69.47 fish per hour, respectively.

The catch rate for smallmouth bass above the plant was consistently low in all three seasons, 2.00 to 2.53 fish per hour. During spring the highest catch rate for smallmouth bass was in the plant area, 8.00 fish per hour. During summer and fall the highest catch rates were below Lock and Dam 3, 11.60 and 7.20 fish per hour, respectively. About one-third of all smallmouth bass caught electro-fishing were young-of-the-year.

More walleyes than saugers were collected in the plant area and below Lock and Dam 3 in spring and summer and in all areas during the fall. In most areas catch rates for walleyes ranged from

1.07 to 4.80 fish per hour. However, during summer and fall the catch rate below the dam was 10.00 and 25.40 fish per hour, respectively. The catch rates for saugers ranged from zero to 3.73 fish per hour in all areas except in fall, when the catch rate below Lock and Dam 3 was 9.20 fish per hour.

2.5.2.3.1.4 Trawling

During 1976 a total of 1,775 fish representing 22 species was collected during 3.30 hours of trawling. Three species, freshwater drum (29.4 percent), channel catfish (26.5 percent), and white bass (18.0 percent), accounted for 73.9 percent of the catch. For each species the catch was largest during spring, declined during summer, and was very low during fall. The following five species (listed in decreasing order of abundance) accounted for an additional 22.1 percent of the catch: white crappie, gizzard shad, black crappie, trout perch, and carp. Tables 2.5.2-14 to 2.5.2-16 summarize trawling catches by season and area. Table 2.5.2-17 is a length-frequency of fish collected during 1976 trawling.

The spring catch of freshwater drum in the plant area (390.48 fish per hour) accounted for almost one-half of all freshwater drum caught during 1976 trawling. This is substantially higher than the next highest catch rate, 212.00 fish per hour, which occurred in the plant area during summer. Catch rates in both areas in fall were low compared with the other season, 14.00 and 17.31 fish per hour. Most freshwater drum caught during all seasons were young-of-the-year.

Only five of 470 channel catfish caught by trawling in 1976 were caught above the plant, three in spring and two in summer. Over 62 percent of the 465 channel catfish were caught in the plant area during spring. Of the remainder, 37 percent were caught in summer and only two fish in fall. Almost 99 percent of the channel catfish caught trawling were young-of-the-year.

Over 83 percent of the white bass caught by trawling were caught in North Lake during 1976 spring sampling. Only 13 white bass were caught trawling in the plant area during 1976. All were young-of-the-year except one caught in fall.

All except three white crappies collected by trawling in 1976 were caught in North Lake. More white crappies were caught in spring than in summer and fall combined. Most were young-of-the-year.

The fall catch of gizzard shad in the plant area was one-half of the total caught in 1976; most were young-of-the-year.

All black crappies caught by trawling in 1976 were collected in North Lake. About 71 percent of the carp were caught in the plant area. Most black crappies were young-of-the-year; all except one carp were adults.

2.5.2.3.1.5 Seining

During 1976, 4,791 fish were collected by 48 seine hauls which covered an estimated total surface area of 1.90 ha. A total of 34 species was collected. Five species comprised over 86 percent

of the total catch: white bass (37.4 percent), emerald shiner (21.2 percent), spottail shiner (11.5 percent), freshwater drum (10.4 percent), and gizzard shad (7.6 percent). Tables 2.5.2-18 through 2.5.2-20 summarize seine catches by area and season. Table 2.5.2-21 is a length-frequency of all fish collected seining in 1976.

The densities of white bass were highest in the plant area and above the plant in spring, an estimated 2,939 and 2,659 fish per ha, respectively. During summer densities declined above the plant and in the plant area, but increased below Lock and Dam 3. Catches of white bass declined considerably in all areas in fall, ranging from 10 to 80 fish per ha.

Catches of emerald shiners were highest below Lock and Dam 3 in spring, in the plant area during summer, and above the plant in the fall. Catches of emerald shiners ranged from 56 to 1,654 fish per ha.

In the plant area, the catch of spottail shiners was highest in spring (212 fish/ha), declined in summer (29 fish/ha), and none were caught in fall. Below Lock and Dam 3, the catch was lowest in spring (69 fish/ha), almost tripled in summer (197 fish/ha), and increased in fall. Above the plant the catch of spottail shiners was lowest in spring (54 fish/ha), increased by a factor of eight in summer (436 fish/ha), and declined in fall (314 fish/ha).

For freshwater drum, the seining catch was highest above the plant and in the plant area in spring, 928 and 760 fish per ha,

respectively. The catch in both areas declined in summer to 189 fish per ha above the plant and 325 fish per ha in the plant area. The catch below Lock and Dam 3 was similar in spring and summer, 116 and 105 fish per ha, respectively. Only two drum were caught in the plant area during fall seining.

The highest catch rate for gizzard shad was in the plant area in spring, 1,061 fish per ha. The second highest was below the dam in fall, 716 fish per ha. Catches in the other areas ranged from 6 to 143 fish per ha during the three seasons.

2.5.2.3.2 Tagging Study

A total of 1,602 fish was tagged during 1976 as part of the Prairie Island fish study. The last date fish were tagged in 1976 was December 8. White bass was the most commonly tagged species (981). The second most commonly tagged species was walleye (347).

A total of 486 tags was returned from April 9, 1974 through January 7, 1977. White bass was the species with the highest number of tags returned (199). The species with the second highest number of tags returned during that period was sauger with 127.

Table 2.5.2-22 summarizes the number of each species tagged and the number of tag returns for the period April 9, 1974 through January 7, 1977. Northern pike had the highest tag return rate (18.91 percent). Sauger was second highest (11.32 percent).

Data processing delays hindered analysis of fish movements from tag return data. Information on fish movements will be presented and discussed in the 1977 Annual Environmental Report.

2.5.2.3.3 Scale Aging

Scales from white bass, smallmouth bass, black crappies, sauger, walleye, and freshwater drum were collected and aged. The number and percentage of fish in each age group is presented in Table 2.5.2-23.

Each sampling gear collects certain sizes and species of fish more effectively than others. Since there is a direct relationship between size and age, the gear used to collect the fish is important. The method of collection was recorded for each scale sample, and if a sufficiently large number of samples was collected using only one type of gear, scales from only that gear were used.

About two-thirds of the fall trap net white bass catch was composed of fish at least three years old. Over one-half of black crappies sampled from fall trap netting were two years old, while more than one-half of the freshwater drum sampled were at least three years old. One-third of the saugers aged were three years old. Three-year-old walleyes accounted for over 26 percent of the walleye catch.

2.5.2.3.4 Length-Weight Relationships and Expected Weights

Separate summer and fall length-weight relationships were calculated for 13 species. Data from all sections were included in

these relationships (Table 2.5.2-24).

Expected weights at specified lengths were calculated for 12 species using the 1976 length-weight equations and the length-weight equation from one or more previous years (Table 2.5.2-25). By inspection, it appears that the expected weights for gizzard shad, carp, shorthead redhorse, rock bass, black crappie, sauger, and freshwater drum were similar between the various years and seasons listed. At the greater lengths, the expected weights during fall 1976 were slightly heavier than during summer 1976 for northern pike, channel catfish, white bass, smallmouth bass, and walleye. Channel catfish had higher expected weights in 1976 than in 1973. Expected weights for smallmouth bass were lower in 1975 than in 1973 or 1976. There does not appear to be any trend in expected weights from the data in Table 2.5.2-25.

2.5.2.3.5 Ancillary Studies

2.5.2.3.5.1 Discharge Electro-fishing Study

Catches of fish varied widely in number and species composition. Numbers of fish caught per five-minute electro-fishing run ranged from zero to 119, whereas the number of species ranged from zero to 11. Catches varied between days at a given station even when temperature conditions were similar.

Mean diversity (\bar{d}_s) and mean temperature (\bar{t}_s) were calculated for each station (Figure 2.5.2-8). The seven stations were grouped by habitat. Station 5, the center of the discharge canal, had the lowest mean diversity of the seven stations (0.81). The

next highest \bar{d}_s values were at Stations 2, 4, and 6, all of which were next to shore over mud bottoms. Stations 1, 3, and 7, all located along rock riprap shorelines, had the highest \bar{d}_s values.

In an effort to describe species composition, the most commonly caught species were determined for each station using the following procedure. The total number of each species caught at a given station during any of the 12 sampling dates were listed, and percent composition calculated for each station for all sampling dates combined. Percentages were arranged in decending order and summed until 90 percent of the total number of fish at that station were included. Species included in the first 90 percent were considered commonly caught species. However, if a species was not included in the top 90 percent, it could also be considered a commonly caught species if it occurred on 50 percent or more of the sampling dates at a given station. After the commonly caught species were listed for each station, stations having similar habitat types were grouped as in Table 2.5.2-26. The frequency with which a species was commonly caught in each habitat type is given on this table. For example, Stations 2, 4, and 6 (mud bottom habitat) were grouped together. Gizzard shad were common at all three stations and was given a "3" rating. Shorthead redhorse were common in only two of these stations and was given a "2" rating.

Commonly caught species varied considerably with habitat types. The most commonly caught species in Station 5, the center of the discharge area, were gizzard shad, carp, emerald shiner, and carpsucker. In Stations 2, 4, and 6 (mud-bottom habitat) the most commonly caught species were gizzard shad and carp, followed by

shorthead redhorse and bluegill. In Stations 1, 3, and 7 (the rock riprap habitats), the most commonly caught species again included gizzard shad and carp, as well as emerald shiners, white bass, and bluegills. Rock bass and walleyes were commonly caught in two of these three rock riprap stations.

2.5.2.3.5.2 Population Estimate

During the mark-recapture study, 19 white bass, 23 walleyes, and one carp were recaptured. This information was used to estimate the number of each species in Stations 3-2 and 3-3. The minimum lengths of white bass, walleyes, and carp included in these population estimates were 19.0 cm, 27.9 cm, and 20.3 cm, respectively.

Two channel catfish, 12 smallmouth bass, three largemouth bass, and 22 saugers were marked during the mark-recapture sampling. None were recaptured so no population estimates could be made. With the exception of one smallmouth bass 11.4 cm long, all marked fish of these four species were at least one year old.

A number of population estimates were made for white bass and walleyes in the discharge canal. Since December 3, 1976 was the last sampling date on which marked white bass were recaptured, the December 3 estimate was used. The population estimate and 95 percent confidence limits for white bass on that date were 7,062 (4,616 to 11,299). The confidence interval is asymmetrically distributed because Poisson variables were used in the calculations (Tables 2.5.2-27 and 2.5.2-28).

The planimetered area of the discharge canal is 6.30 ha (15.56 acres). Using this area, the number of white bass was estimated at 1,121.0 fish/ha with a confidence interval of 733.0 to 1,793.5 fish/ha (296.5 to 726.0 fish/acre).

The mean length of white bass marked during the study was 31.2 cm. The fall 1976 length-weight relationship was used to estimate weights of individual white bass marked. The mean weight of marked white bass was 0.316 kg. The estimated standing crop of white bass in the discharge canal on December 3 was 2,232.5 kg (4,920.0 lbs). This is 354.5 kg/ha (316.0 lbs/acre) with a confidence interval of 231.5 kg/ha to 566.5 kg/ha (206.5 lbs/acre to 506.0 lbs/acre). All biomass estimates are to the nearest 0.5 kg.

The estimated population of walleyes in the discharge area on December 8, 1976, was 1,056 (Table 2.5.2-29). The confidence limits are 716 to 1,625. Scale aging information indicates that walleyes 27.9 cm or longer are at least one year old (Gustafson, Geis, and Diedrich 1976).

The mean length of walleyes captured during the population estimate was 44.9 cm. Using the length-weight relationship for walleyes from fall 1976, the individual weights of marked walleyes were estimated. The mean weight of marked walleyes was 0.736 kg. The estimated standing crop in the discharge area on December 8 was 777.0 kg (1,713.5 lbs), 123.5 kg/ha (110.0 lbs/acre) with lower and upper 95 percent confidence limits of 83.5 kg/ha to 190.0 kg/ha (75.0 lbs/acre to 169.5 lbs/acre).

The sole recapture of a marked carp was made on the last sampling date, December 8, so only one estimate could be made. The mark on this carp was the same used the first two marking dates and on December 8, so it is uncertain whether or not this fish was recaptured on the same day in which it was marked. Although one recapture does not permit a very accurate population estimate, one was made to get some indication of the number of carp present in Stations 3-2 and 3-3. To make this estimate, it was assumed that the recaptured carp had been marked prior to December 8. Using this assumption, there were an estimated 9,086 carp in this area on that date (Table 2.5.2-30). Due to the small sample size, the confidence limits were wide, 2,753 to 16,521 fish.

About 88 percent of the marked carp were 40.0 cm or more in total length. The mean length of marked carp was 45.4 cm. The 1976 fall length-weight relationship was used to calculate the weight of individual carp. The mean estimated weight of marked carp (1.59 kg) was used to estimate the standing crop. Using the estimate of 9,086 carp, the estimated standing crop was 2,293.0 kg/ha (2,047.0 lbs/acre) with a lower confidence limit of 695.0 kg/ha (620.0 lbs/acre) and an upper limit of 4,169.5 kg/ha (3,722.0 lbs/acre).

2.5.2.3.5.3 Temperature Monitoring

Results of the 1976 temperature monitoring are presented in Figure 2.5.2-9. Midnight temperatures were used to eliminate the effects of direct sunlight. The highest temperature recorded was 29.4°C (85°F) on July 13, 1976; the lowest was 3.9°C (39°F) on October 25.

Temperatures toward the end of October were lower in 1976 than they were in 1975. For example, the mean midnight temperature October 22-24, 1976 was 7.1°C (45°F) compared with 12.4°C (54°F) for those dates in 1975.

2.5.2.4 Discussion

2.5.2.4.1 Abundance Indices

Abundance indices measure the abundance of major fish species in each year relative to a base period. This method of handling catch data was devised by Hile (1962); calculations and applications to the Prairie Island fish study are explained by Naplin and Geis (1974).

Mean catch rates for each major species were calculated using summer and fall trap net catches and fall gill net catches from 1973 to 1976. Table 2.5.2-31 lists the number of summer and fall trap net and fall gill net sets used to calculate abundance indices for each year. This four-year period was used as the base period. Spring trap net and gill net catches were not used for calculations, because seasonal spawning movements of fish might bias fish species abundance. Electro-fishing, seining, and trawling were used to measure various other parameters of the fish population.

Twelve species were selected for abundance comparisons. They were: shortnose gar, gizzard shad, northern pike, carp, short-head redhorse, white bass, bluegill, white crappie, black crappie, sauger, walleye, and freshwater drum. These species each com-

prised at least 1.00 percent of the catch during 1976 summer or fall trap netting or fall gill netting, and were important in the catch during previous years.

Abundance indices for most of the species varied considerably from year to year. A chi-square test was used to determine whether a significant difference existed at the 95 percent level between expected catch and observed catch. Table 2.5.2-32 lists the abundance indices for the 12 species from 1973 through 1976. In cases where the chi-square test indicated significant difference, the abundance index is marked with an asterisk.

For each of the above 12 species the abundance index for each year was plotted against time. The equation for the linear regression of abundance indices versus time was calculated using the least-squares method and the correlation coefficient (r) computed for each regression equation (Figure 2.5.2-10). These calculations were done to determine whether trends could be noted in abundance.

The abundance indices for seven species appear to have had no consistent trend, correlation coefficients were less than or equal to 0.503. The seven species are: shortnose gar, gizzard shad, carp, shorthead redhorse, white bass, bluegills, and drum. There has been no definite trend in abundance of these species over the last four years. With four years of data, two degrees of freedom, a correlation coefficient of 0.950 indicates a significant trend at the 95 percent level. If the correlation coefficients continue at these levels, at least 16 years of data will be needed before these values of r will be significant at the 95 percent level.

Abundance indices for white and black crappies have increased each year since 1973. The abundance index for white crappies was 0.15 in 1973 and 2.29 in 1976. Black crappies had an abundance index of 0.52 in 1973 and 1.19 in 1976.

The correlation coefficient of the regression was 0.880 for white crappies and 0.913 for black crappies. These values do not presently indicate a significant trend at the 95 percent level. However, if the correlation coefficients remain at present levels in future years, the increase in abundance could be statistically significant (at the 95 percent level) with one or two years of additional data.

The abundance indices for northern pike, walleye, and sauger declined from 1973 through 1976. The abundance index for northern pike was 1.29 in 1973 and 0.63 in 1976. For walleyes, the abundance index was 1.64 in 1973 and 0.83 in 1976. The abundance index for saugers was 1.74 in 1973 and 0.52 in 1976. The correlation coefficients of the regressions were -0.905 for northern pike, -0.863 for walleyes, and -0.929 for sauger. These apparently decreasing trends in abundance could be statistically significant at the 95 percent level with one or two years of additional data if the correlation coefficients remain at present levels.

2.5.2.4.2 Discharge Electro-fishing Study

Station 5 had the lowest diversity index (\bar{d}_s) of the seven stations (Figure 2.5.2-8). One reason for this low diversity is that Station 5 is three-to four-meters deep; deeper than any other station. The electro-fishing gear is not effective to that depth so only a portion of water column was sampled. Also,

this station lacks favorable habitat for larger fish and forage species except gizzard shad.

The mud bottom shoreline habitat of Stations 2, 4, and 6 was better than that of Station 5, but its \bar{d}_s values were lower than those for rock riprap stations. Peterson (1975) indicates that "the diversity index should be between 1.8 and 2.6 in an ordinary stretch of warm-water river. Lower numbers indicate stress..." All stations which have mud bottoms had mean diversity indices of 1.34 or less, indicating stress. No effect of temperature was evident, possibly because the fish population was already under some degree of environmental stress.

In the rock riprap habitat of Stations 1, 3, and 7, mean diversity indices for all 12 sampling dates combined ranged from 1.49 to 2.18, higher than any other stations. Past sampling has indicated an abundance of fish in almost any area of the river where there is rock riprap.

A number of environmental factors may affect diversity. The effects of temperature on diversity are examined in the following section. The results given in this section consider only temperature, but other factors in addition to temperature may have influenced the results which were noted.

The results of the discharge electro-fishing study appeared to indicate an inverse relationship between mean temperature and mean diversity when data for all 12 sampling dates were combined (Figure 2.5.2-8). An examination of mean temperatures and diversities from all 12 sampling dates indicates Section 7 (the intake area) had lowest overall mean temperature and the

highest overall mean diversity of the three rock riprap stations. Station 1 (the discharge canal) had the highest mean temperature and the lowest mean diversity of this habitat type.

However, since this figure contains mean values for temperature and diversity over a wide temperature range, it does not indicate much about the effects of temperature extremes. By using a mean temperature for all 12 sampling dates combined, low, moderate, and high temperatures are included, potentially masking or distorting the effects of temperature extremes.

In an effort to isolate the effects of high temperatures on diversity, mean bottom and surface temperatures were calculated for each electro-fishing run. These calculations were done only for stations having rock riprap substrate, because fish populations at the mud-bottom stations already appeared to be under some degree of environmental stress. For each of the riprap stations, the runs having both mean surface and mean bottom temperatures 20.0°C or greater were grouped together and classified as the "high" temperature range. Electro-fishing runs from Stations 1, 3, and 7 having both mean surface and bottom temperatures ranging from 7.0°C through 19.9°C were grouped and classified as the "low" temperature range. Overall mean surface and bottom temperatures were calculated for both high and low temperature ranges for Stations 1, 3, and 7. Using diversities from electro-fishing runs within each temperature range, mean diversities were calculated for Stations 1, 3, and 7 for both low and high temperature ranges (Figure 2.5.2-11).

In the low temperature range, there is little difference between the mean diversities of Stations 1, 3, and 7. The mean diversi-

ties range from 1.727 to 2.008. In the high temperature ranges, however, there is a greater difference in diversity between stations. In this temperature range, mean diversity ranges from 1.353 in Station 1 to 2.627 in Station 7.

Considering the runs having mean surface and mean bottom temperatures above 20.0°C, mean surface temperatures were within 0.3°C of each other (Figure 2.5.2-11). However, Station 7 continued to have the highest diversity of the rock riprap stations, followed by Stations 3 and 1. Since the mean surface temperatures are so similar between Stations 1, 3, and 7, but diversities are different, diversity appears to be affected by factors other than surface temperature only.

Mean bottom temperatures for Stations 1, 3, and 7 varied more between stations than mean surface temperatures. Station 1 had a mean bottom temperature of 25.2°C compared with 23.9°C for Station 7. Stations 3 and 7 had greater differences between mean surface and bottom temperature than did Station 1. Apparently Stations 3 and 7 are more stratified than Station 1.

It seemed possible that diversity for a given electro-fishing run might be related to the amount of difference between maximum and minimum temperatures within that run. To investigate this possibility, data from the three sampling dates having the highest temperatures were examined. Data from each run on these dates for Stations 1, 3, and 7 were listed in order of diversity index. The maximum and minimum temperatures recorded at each run were listed as well as the difference between the maximum and minimum. The higher diversity indices generally coincided with

temperature differences (maximum - minimum) around 5°C (Table 2.5.2-33).

The data in Table 2.5.2-33 appear to indicate that during periods of high water temperature (e.g., above 28.0°C) fish move away from the discharge area and seek more favorable conditions. They probably move to other rock riprap areas, such as the intake (Station 7), and downstream from the discharge (Station 3). Further sampling will be conducted in 1977 to investigate fish movements at high temperatures.

2.5.2.4.3 Population Estimate

Peterson (1975), discussing fish present in Minnesota's streams and rivers, included the following species in the category of "game fish"; trout, northern pike, channel catfish, white bass, smallmouth bass, sauger, and walleye. During electro-fishing for the discharge area population estimate, white bass and walleyes were collected much more frequently than any other game fish. Unless white bass and walleyes were much more susceptible to electro-fishing than other game fish, it appears that these two species were more abundant in the discharge canal than were channel catfish, smallmouth bass, largemouth bass, or saugers. Boom shockers are not very efficient for collecting northern pike.

Excluding minnows, darters, and other small fish, the average standing crop of fish in Mississippi River backwater areas is estimated to be 324 lbs /acre (363.2 kg/ha) (Peterson 1975). Game fish comprised 21 percent of this biomass. From this estimate, the average standing crop of game fish in Mississippi

River backwaters is approximately 76.2 kg/ha (68 lbs/acre). If central values from the population estimates for white bass and walleyes are combined, the results would be as follows:

$$\begin{aligned} &354.3 \text{ kg/ha white bass} + 123.4 \text{ kg/ha walleye} \\ &= 477.7 \text{ kg/ha game fish} \end{aligned}$$

This estimate of standing crop is over six times greater than the 76.2 kg/ha mentioned above. The 477.7 kg/ha does not include other game fish collected and tagged during the sampling, so this estimate may, in fact, be low. This information appears to substantiate the hypothesis that some game fish are attracted to the heated discharge of the Prairie Island Plant during winter months.

Carp and catostomids usually account for about 90.1 percent of the fish population by weight in large Minnesota rivers (Peterson 1975). Multiplying the average standing crop estimate of 363.0 kg/ha by 90.1 percent, the result is 327.0 kg/ha of carp and catostomids. The lower confidence limit for the standing crop of carp was 695.0 kg/ha. This is more than twice the expected biomass for an average standing crop of both carp and catostomids.

The results of the population estimate indicate that carp, white bass, and walleyes are attracted to the heated discharge of PINGP during winter months. It is likely that a number of other species are also attracted to the heated discharge during this period. One species observed in large numbers in the discharge canal during winter months is gizzard shad.

2.5.2.4.4 Impingement

Six species, gizzard shad, channel catfish, white bass, black and white crappies, and freshwater drum, have comprised over 91 percent of fish impinged each year on the traveling screens at PINGP from 1974 through 1976. Gizzard shad comprised the highest percentage of fish impinged each year. Percent composition of fish other than gizzard shad has increased each year from 6.4 percent in 1974 to 24.6 percent in 1975 and 47.5 percent in 1976. Impingement information in this section is from Anderson 1975, Mayhew and Hess 1976, and Section 2.5.2.1 of the 1976 Prairie Island Annual Report.

Total numbers of gizzard shad impinged each year have varied during the three years: 136,667 in 1974, 70,506 in 1975, and 152,878 in 1976. Percent of total catch comprised by gizzard shad has declined considerably from 1974 to 1976 (1974: 93.6 percent, 1975: 75.4 percent, 1976: 58.5 percent). No trend is apparent between electro-fishing catch rates of gizzard shad above or in the plant area in summer and fall and the number of gizzard shad impinged on traveling screens that year.

Four hundred sixty-five of 470 channel catfish collected by trawling in 1976 were caught in the plant area, 290 during spring and 173 during summer trawling. All except seven of these were young-of-the-year fish. Young-of-the-year channel catfish were also collected by trawling in the plant area in other years, but in smaller numbers (Hawkinson 1974, Naplin and Geis 1975, and Gustafson, Geis, and Diedrich 1976). It appears that the plant area may be a nursery area for this species.

In 1976, 8,457 channel catfish were impinged on the traveling screens at PINGP (6,223 in 1975). There appears to be no correlation between trawling catch rates of channel catfish in the plant area and number of channel catfish impinged that year. Trawling catch rates of channel catfish were low in the plant area in 1975. However, if the plant area is a nursery area for young-of-the-year channel catfish, high impingement rates of this species will probably continue unless some change is made in the intake design.

White bass were impinged on the traveling screens in considerably higher numbers in 1976 than in any of the previous years the plant was operating. In 1975, 2,712 white bass were impinged at Prairie Island compared with 44,638 in 1976 (1,367 in 1974). A high percentage of these were young-of-the-year fish, although some adult fish were also impinged.

White bass apparently had a very successful hatch in 1976, because young-of-the-year white bass were caught at significantly higher rates than in previous years. In 1976, the electro-fishing catch rate for white bass during the summer sampling period, when highest impingement rates were occurring, was 58.00 fish per hour compared with 13.20 in 1974 and 3.52 in 1975. The average electro-fishing catch per effort for the whole year was 30.22 fish per hour in 1976 compared with 6.59 and 2.45 fish per hour in 1974 and 1975, respectively.

Data from seining and trawling also indicate considerably higher numbers of young-of-the-year white bass were present in the source water body in 1976 than in 1974 or 1975. It appears that impingement of large numbers of young-of-the-year white bass may only

occur in years when there is a very successful hatch.

The total number of white and black crappies impinged at Prairie Island in 1976 was over three times higher than the number impinged in either 1974 or 1975. Most impinged crappies were young-of-the-year. There is no apparent correlation between catch rates of young-of-the-year crappies collected electro-fishing, seining, or trawling and the number impinged.

The total number of freshwater drum impinged in 1976 was over nine times higher than the number impinged in either 1974 or 1975. Catches of freshwater drum for seining in 1976 was over 16 times higher than catches in either 1974 or 1975. The electro-fishing catch rate of young-of-the-year freshwater drum in 1976 was about three and one-half times the catch rate in 1974 and over six times the 1975 catch rate. However, the trawling catch rate in 1974 was almost one and one-half times the 1976 catch rate. No consistent relationship is apparent between gear catches and number of fish impinged each year.

2.5.2.5 Summary

A fourth season of sampling was conducted in 1976 to determine the effects of the Prairie Island Nuclear Generating Plant near Red Wing, Minnesota on the fish population of the Mississippi River in the vicinity of the plant. Five types of gear were used to collect fish to monitor changes in the population.

Abundance indices were determined for 12 species. For 1973 through 1976, abundance indices for the following seven species remained fairly constant: shortnose gar, gizzard shad, carp,

shorthead redhorse, white bass, bluegill, and freshwater drum. Abundance indices for white and black crappies increased from 1973 through 1976. Abundance indices for northern pike, saugers, and walleyes tended to decrease from 1973 through 1976. If the indices continue to change at their present rate for these five species, data from additional years will be needed before the trends can be judged statistically significant at the 95 percent level.

Diversity indices and species composition were used to examine fish distribution in the plant area. Diversity indices were highest along rock riprap shorelines. Mud-bottom areas had lower diversities than riprap areas, and the center of the discharge canal had the lowest diversity.

Diversity in areas with a mud bottom and in the center of the discharge channel did not vary much with increased temperatures. Low diversity indices for these areas indicated stress even at lower temperatures. Diversity indices in the riprap areas appear to indicate that fish move from the discharge canal to other riprap areas during times of high-water temperatures.

Species composition varied with the habitat, however, gizzard shad and carp were common in all three habitat types.

A mark-recapture study estimated fish populations in the discharge canal during late fall and winter. Population estimates for white bass, walleyes, and carp indicated that standing crops in the discharge canal during this period were considerably higher than the average standing crop for Mississippi River backwater areas.

Expected weights at various specified lengths were similar in 1976 to expected weights in past years. No apparent trends in expected weights were noted.

No consistent relationships are apparent between gear catch rates for a given species and the number of that species impinged on the traveling screens at PINGP.

2.5.2.6 Acknowledgements

We wish to thank Jeff Dittrich, Dave Magnus, Steve Wall, and George Clymer for their aid in collecting and compiling data for this report. Arthur Peterson, Minnesota DNR, provided indispensable suggestions and advice on experimental design and data analysis. Howard Krosch, Minnesota DNR, provided help with data analysis and experimental design, as well as reviewing early drafts of this manuscript. Dr. Lloyd L. Smith, University of Minnesota, was helpful in preliminary design for the population estimate. John Enblom, Minnesota DNR, provided essential technical assistance with DC electro-fishing gear. Special thanks are due to Marcia Helmberger, Lana Knoke, Debra Nelson, Toni Thomas, and Lillian Jelinek for typing the tables and early drafts of this report.

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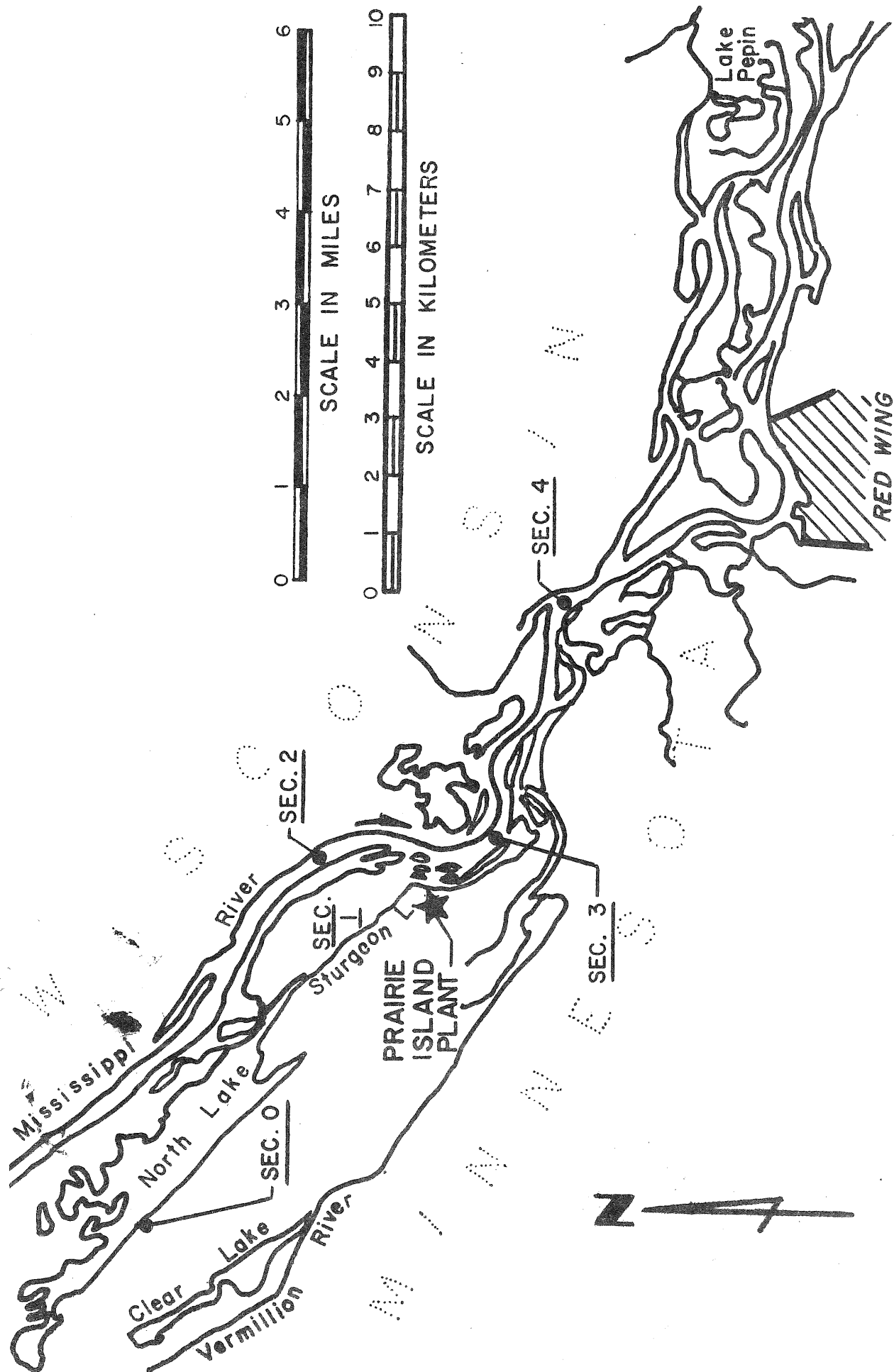


FIGURE 2.5.2-1 THE FISH POPULATION STUDY SECTIONS USED IN THE PRAIRIE ISLAND GENERATING PLANT AREA

Figure 2.5.2-2 Sampling stations in North Lake (Section 0)

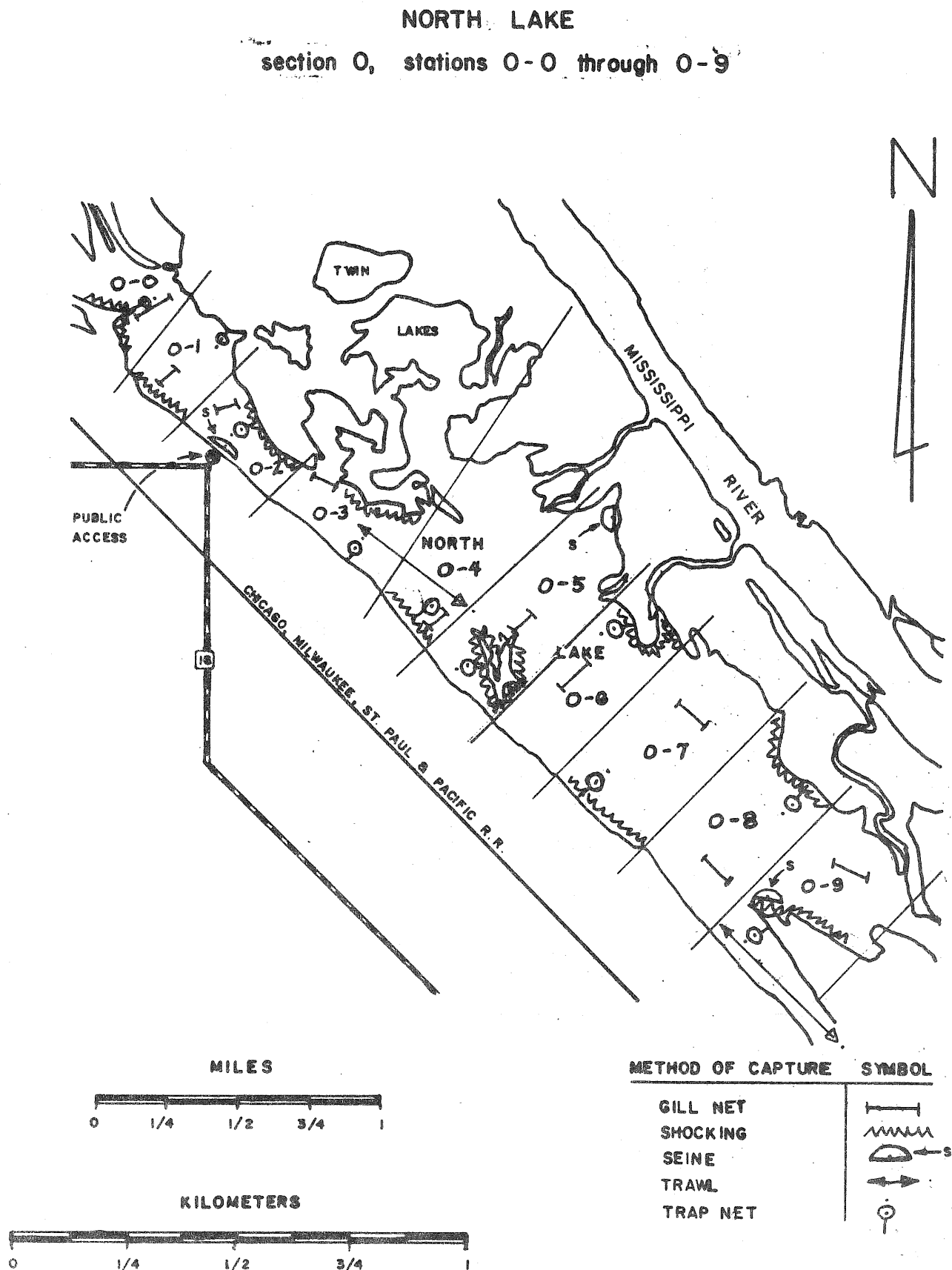


Figure 2.5.2-3 Sampling stations in Sturgeon Lake (Section 1) and in the navigation channel above the Prairie Island Plant (Section 2)

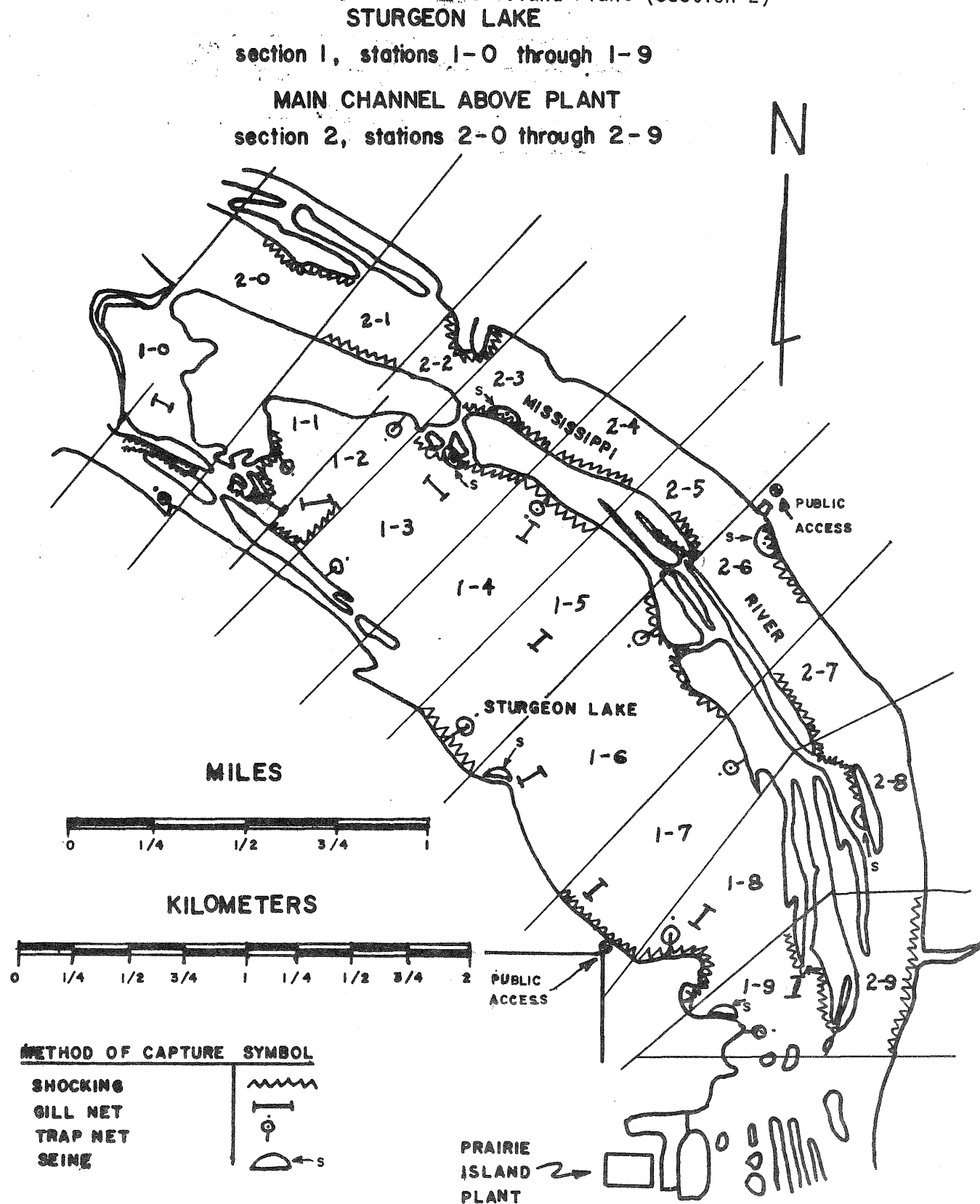


Figure 2.5.2-4 Sampling stations in the plant area (Section 3)

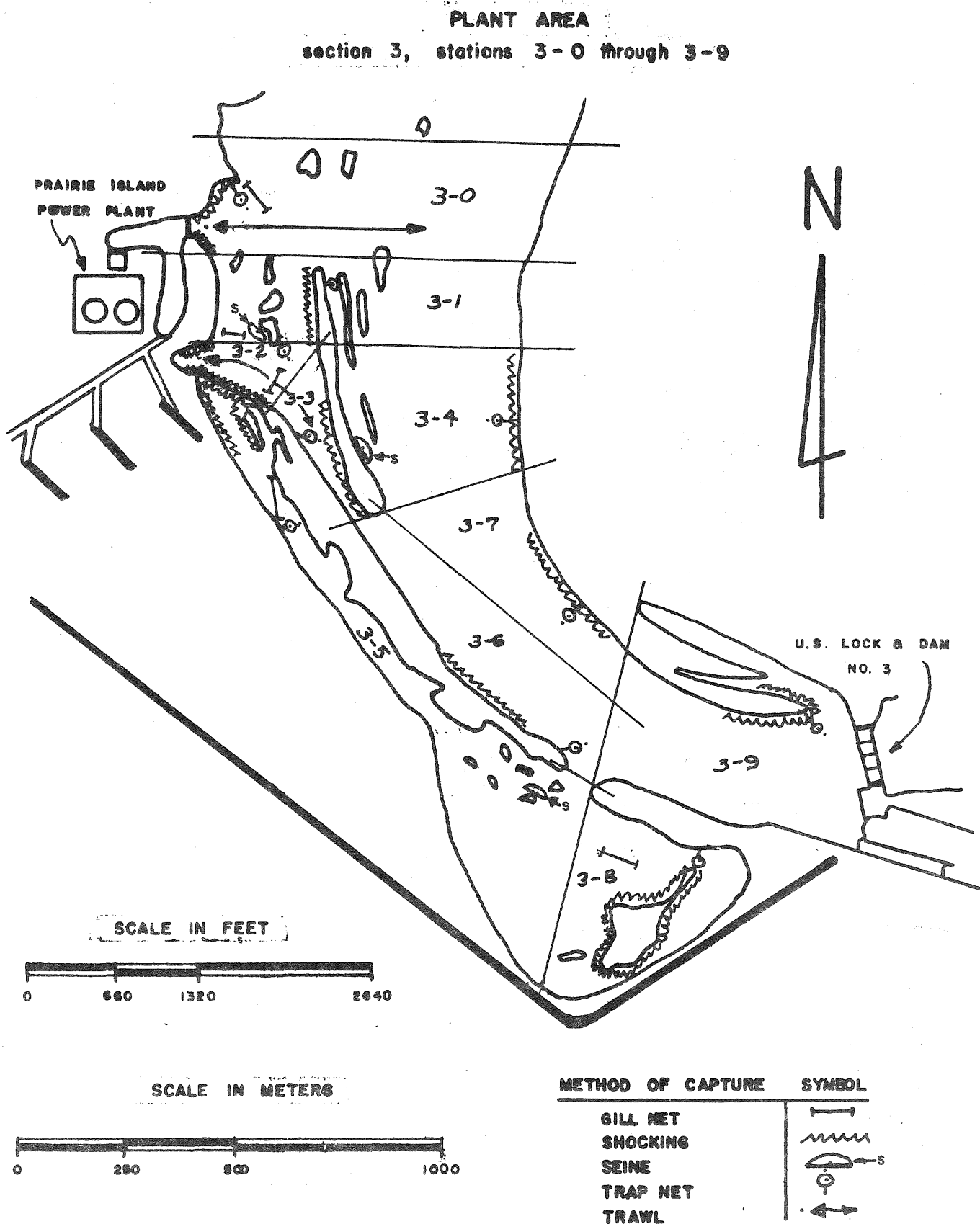


Figure 2.5.2-5 Sampling stations below Lock and Dam 3 (Section 4)

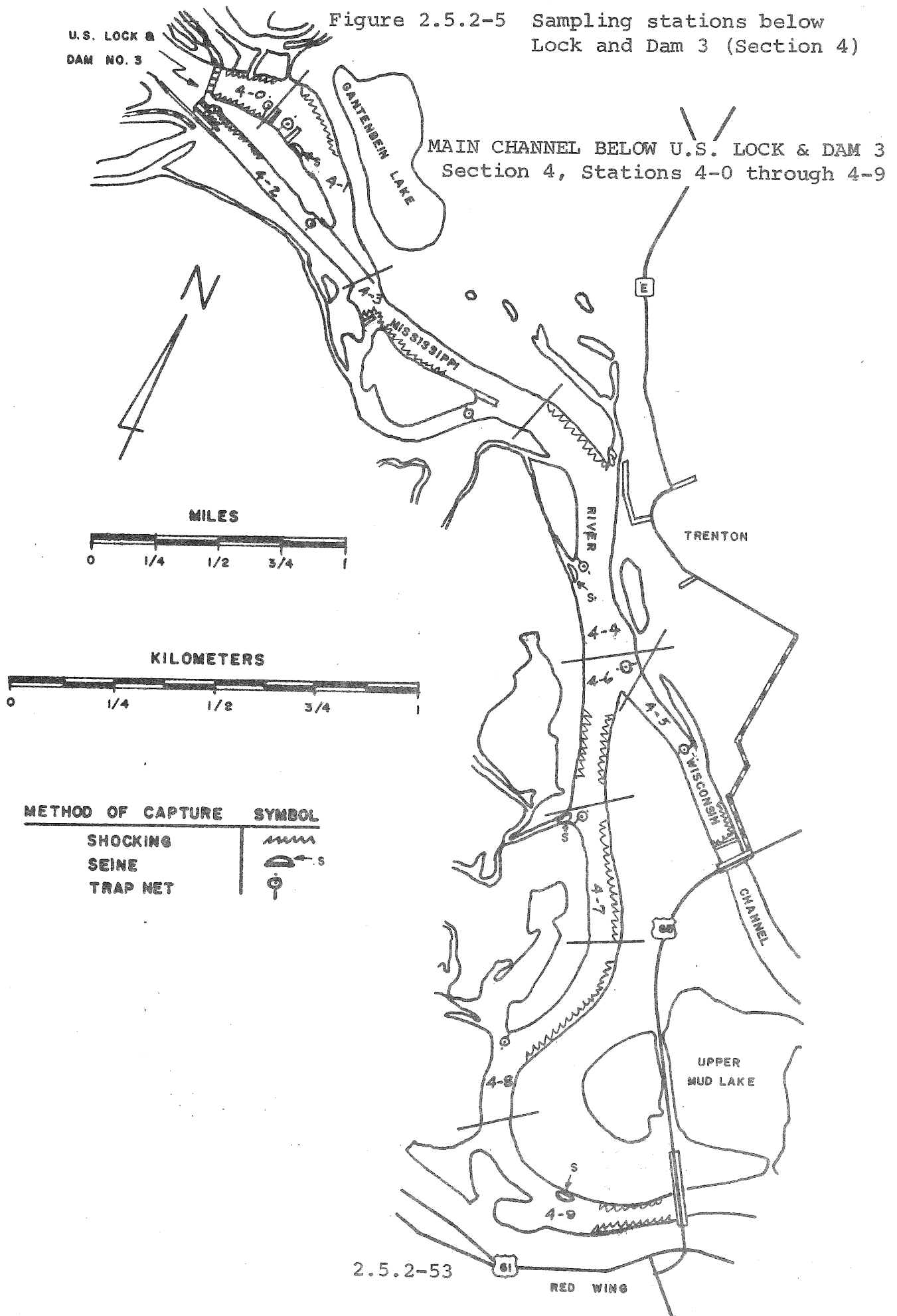


Figure 2.5.2-6 Sampling stations used for the discharge electro-fishing study, 1976

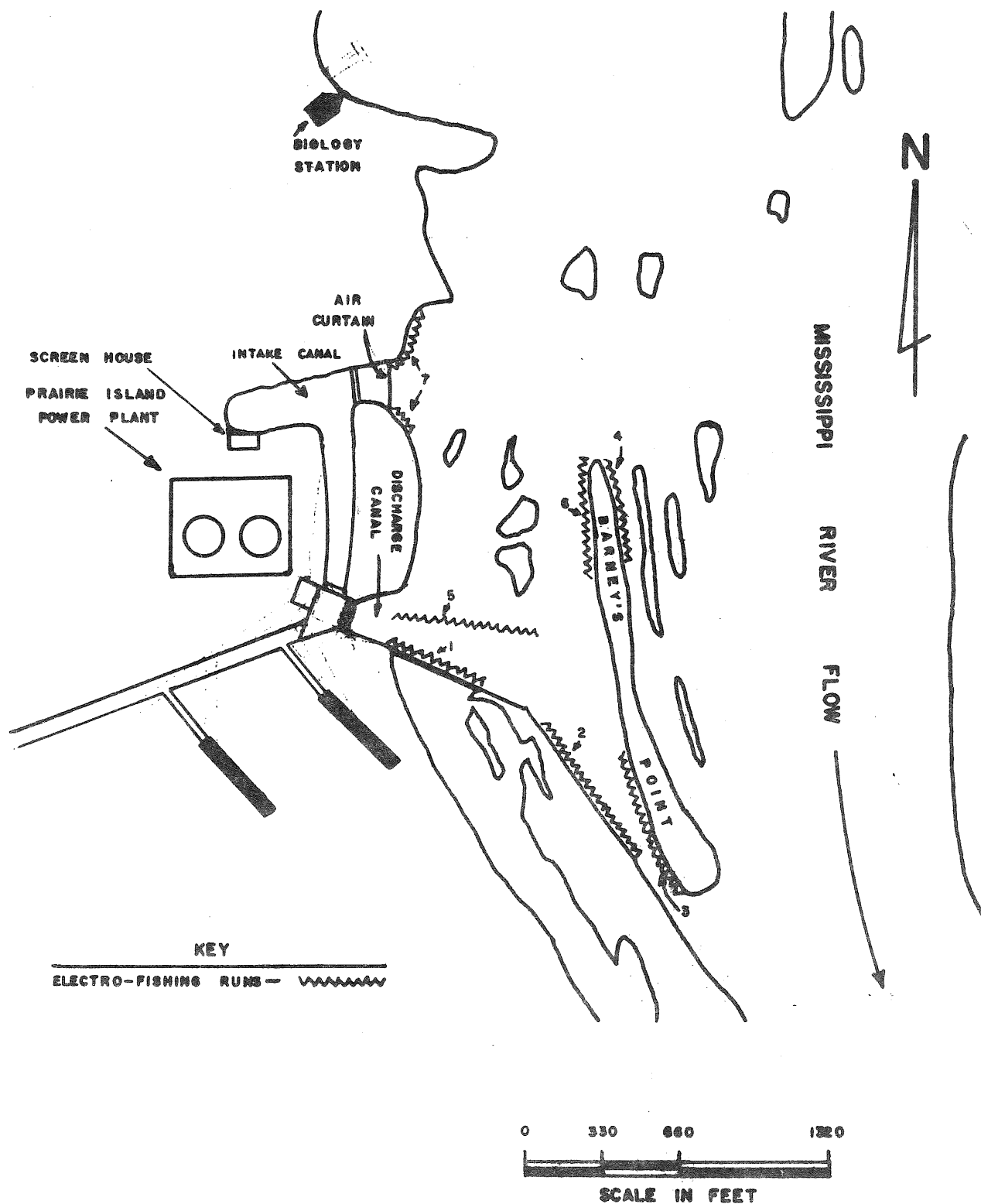


Figure 2.5.2-7 Sampling stations used for the mark-recapture population estimate, 1976

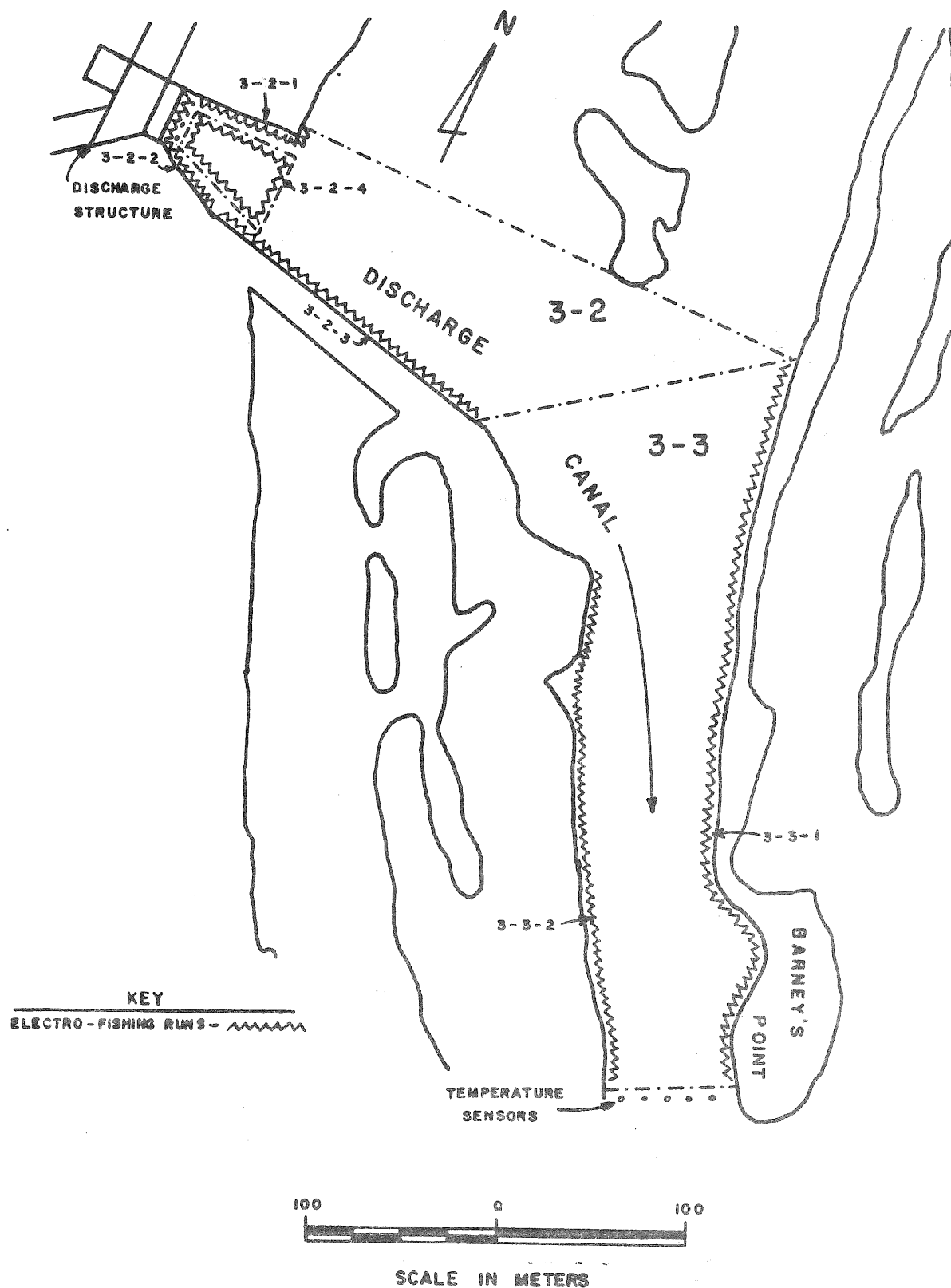


Figure 2.5.2-8 Mean temperatures and mean diversities in the discharge electro-fishing study, all 12 sampling dates combined

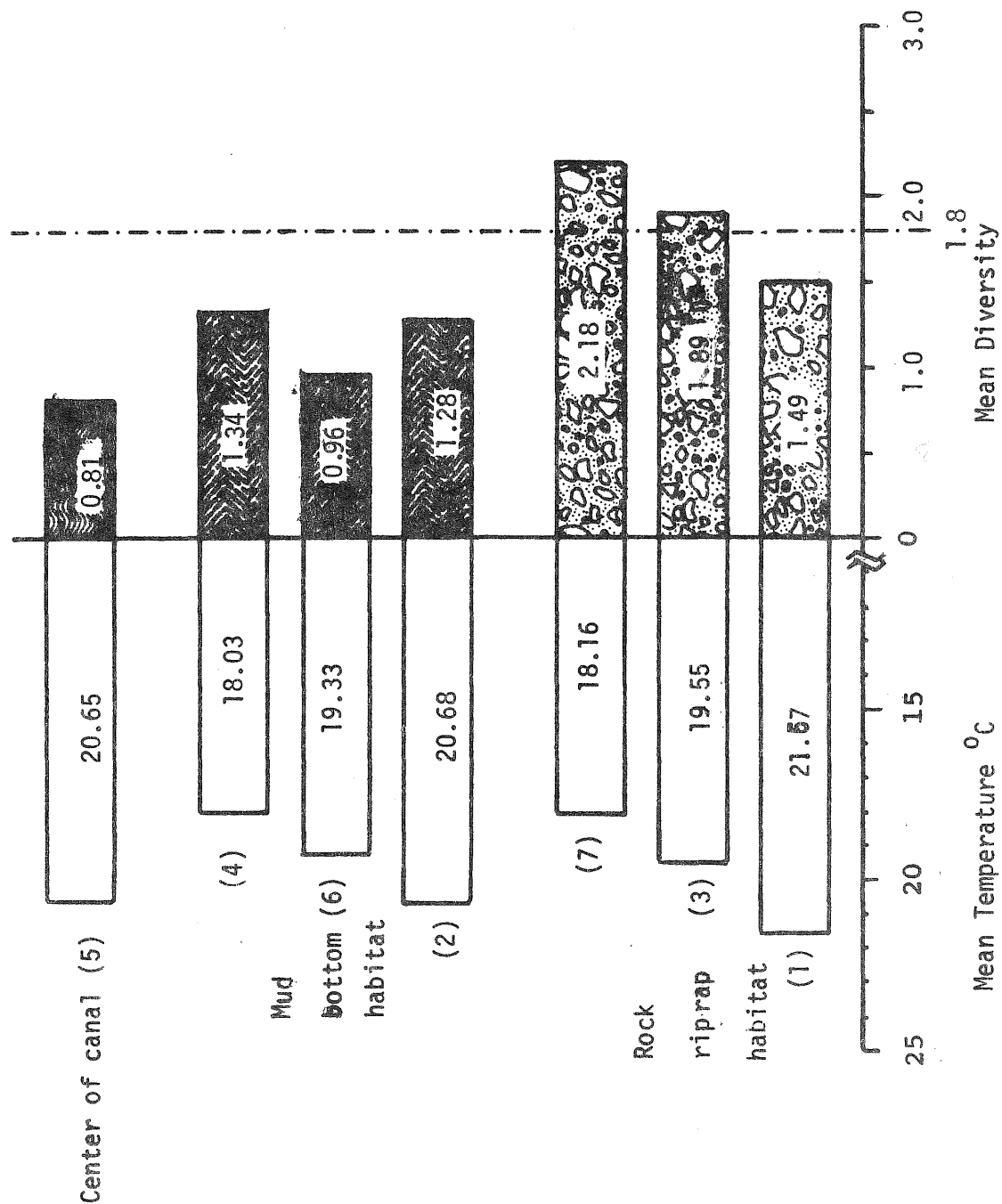


Figure 2.5.2-9 Water temperature in Sturgeon Lake, April through October, 1976 (all temperatures taken at midnight at approximately 1 m depth).

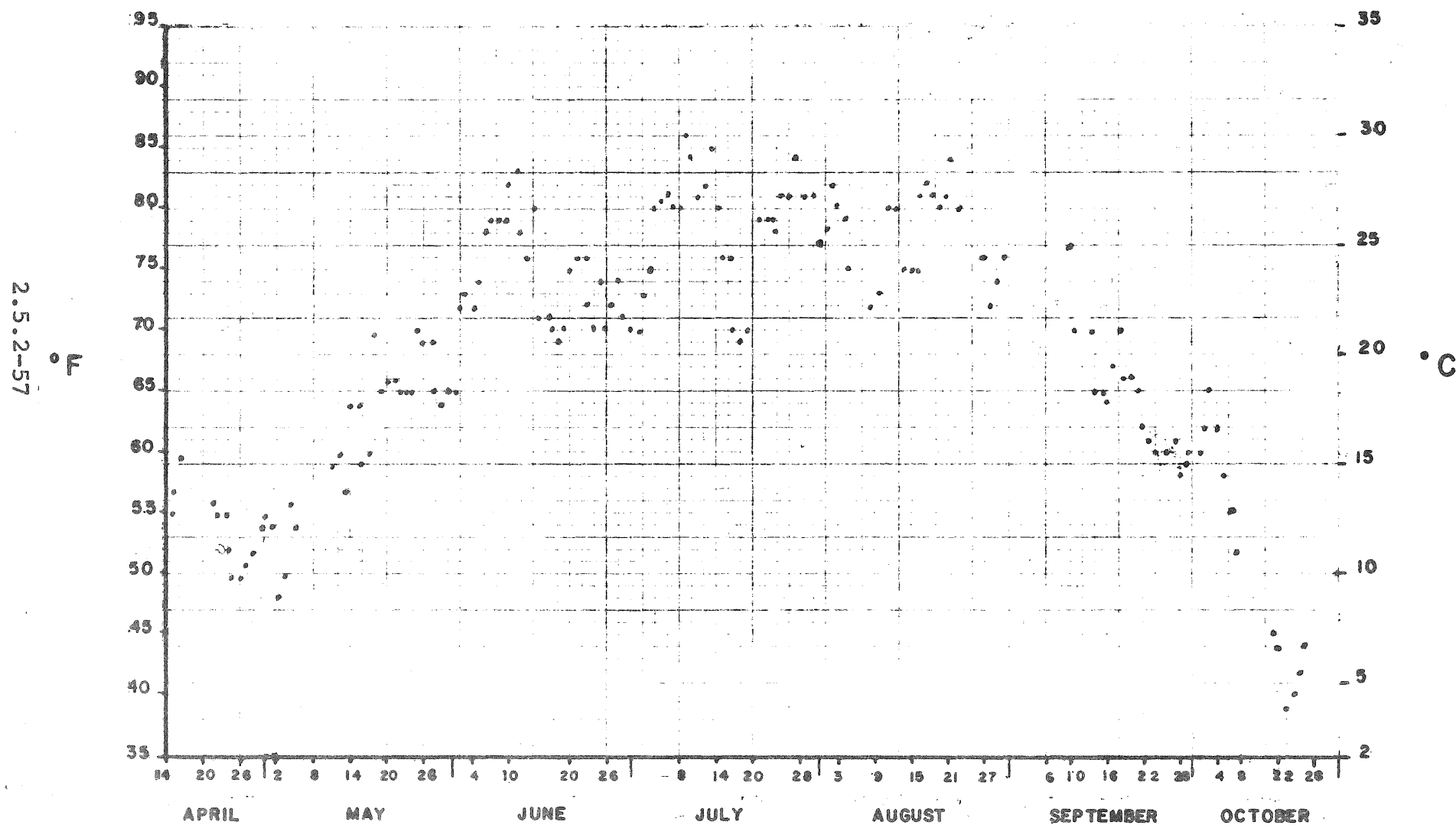


Figure 2.5.2- 10

Abundance indices 1973 through 1976 for 12 species in the
Prairie Island vicinity.

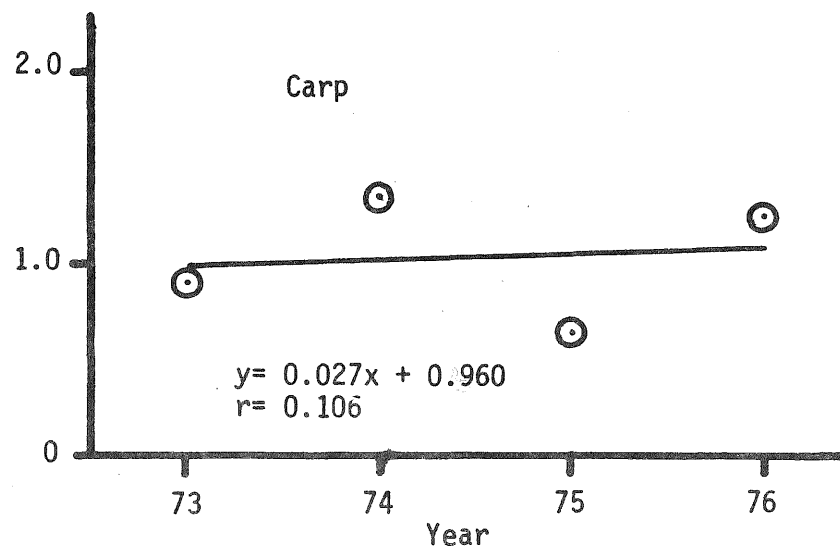
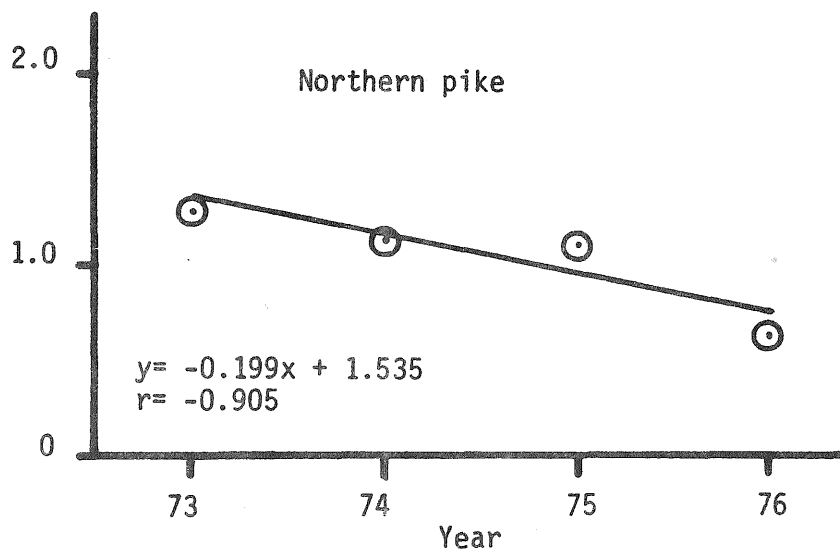
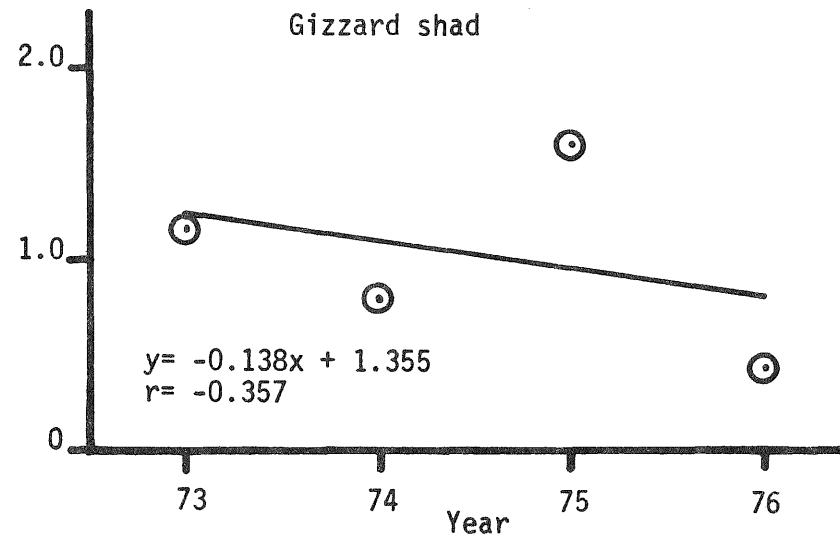
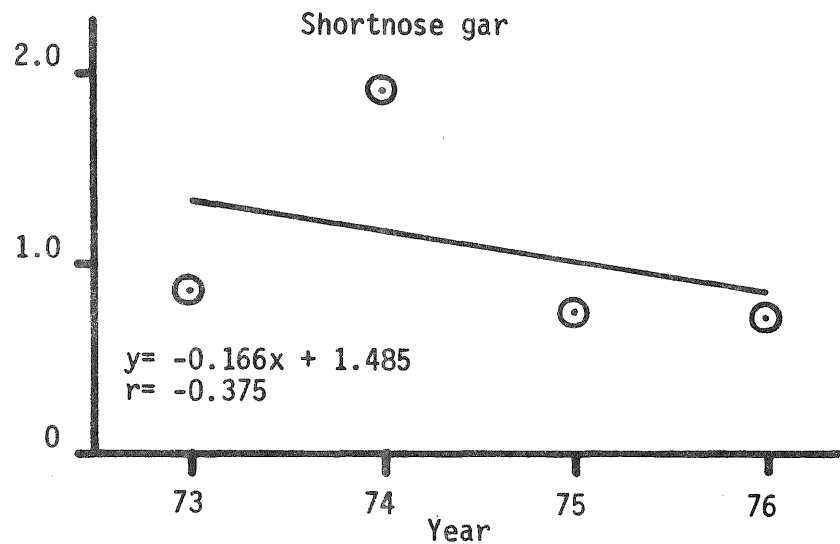


Figure 2.5.2-10(continued)

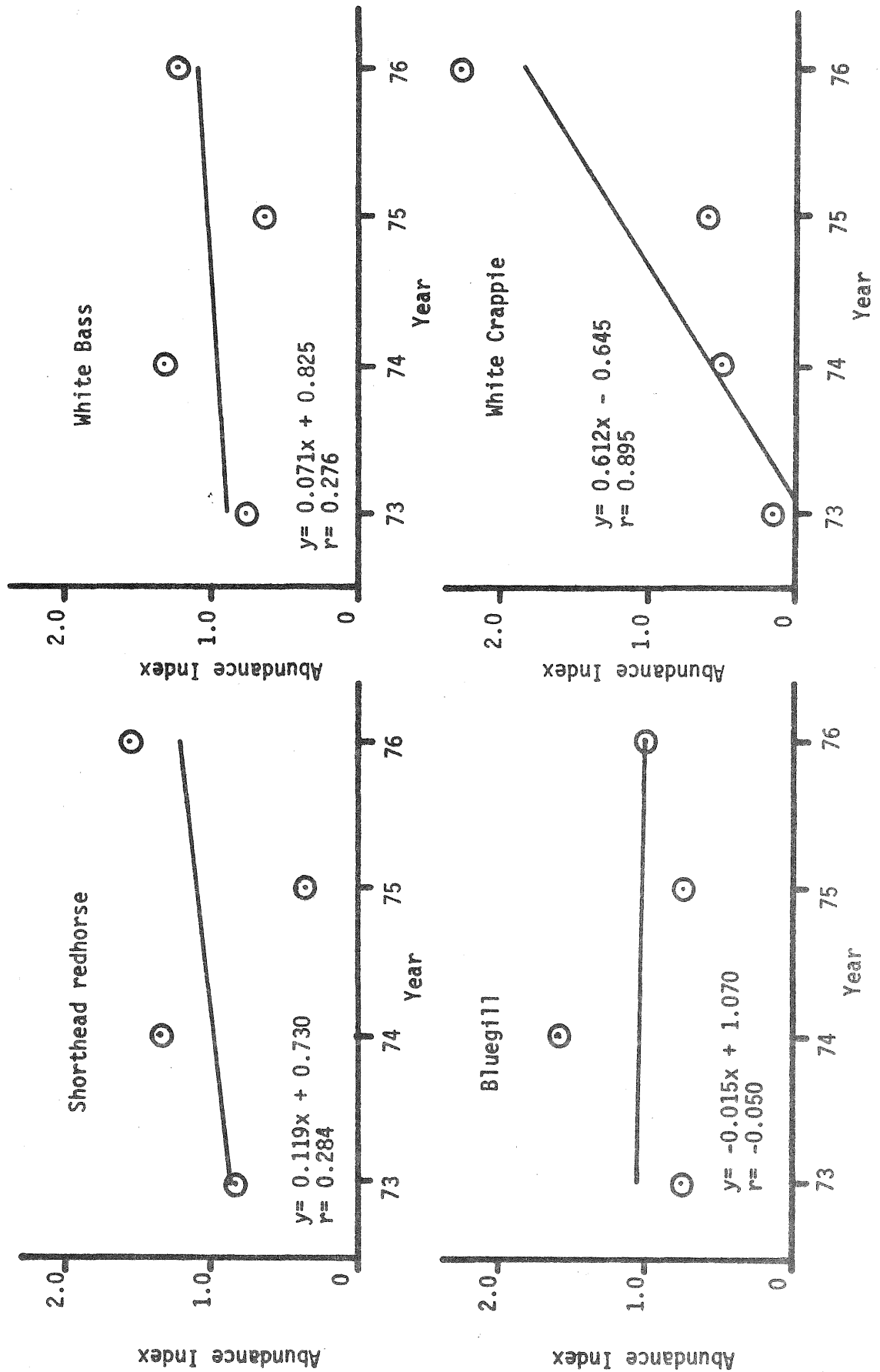


Figure 2.5.2-10(continued)

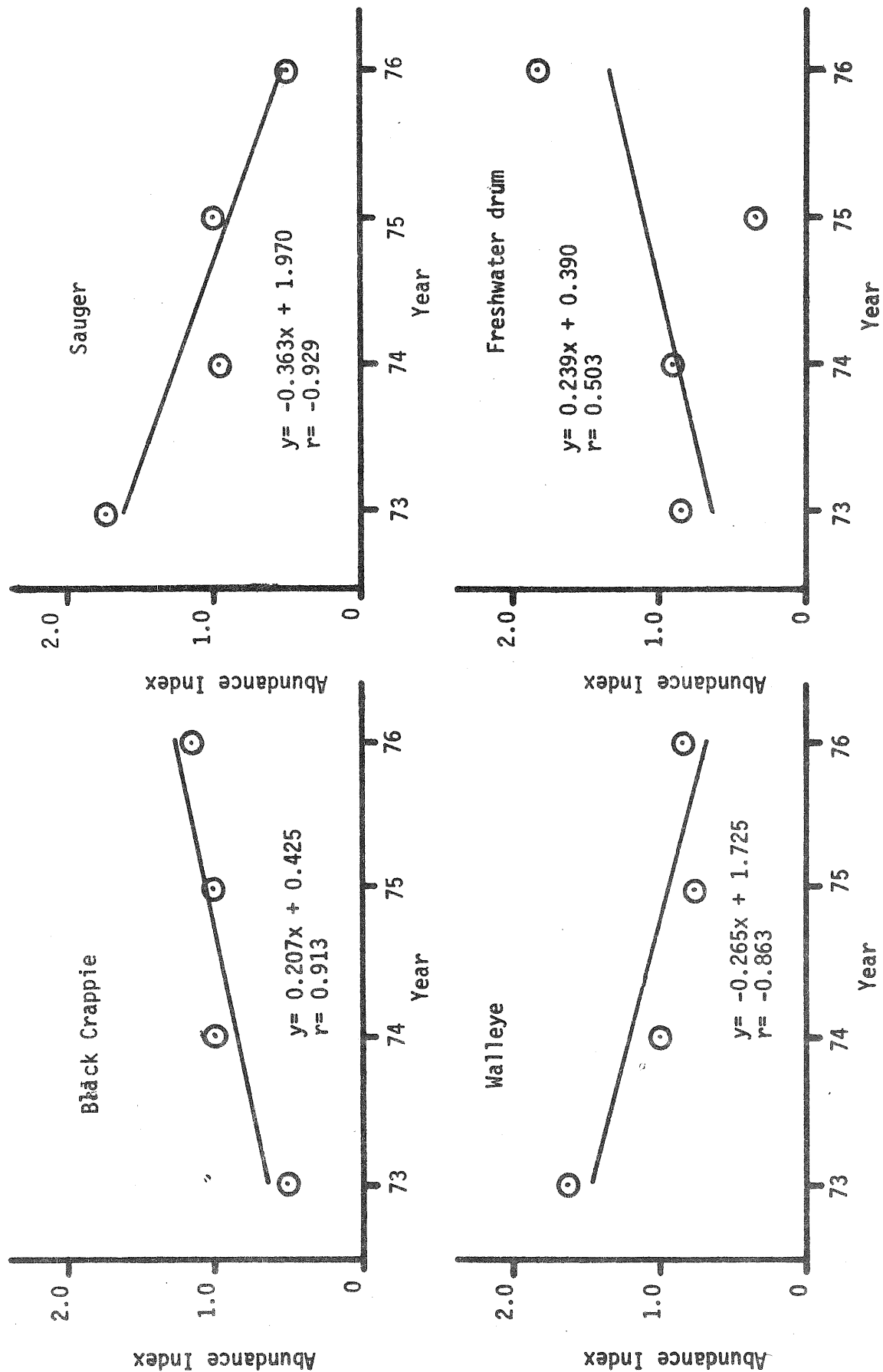


Figure 2.5.2-11 Mean diversities at three rock riprap stations for mean temperatures above and below 20.0°C

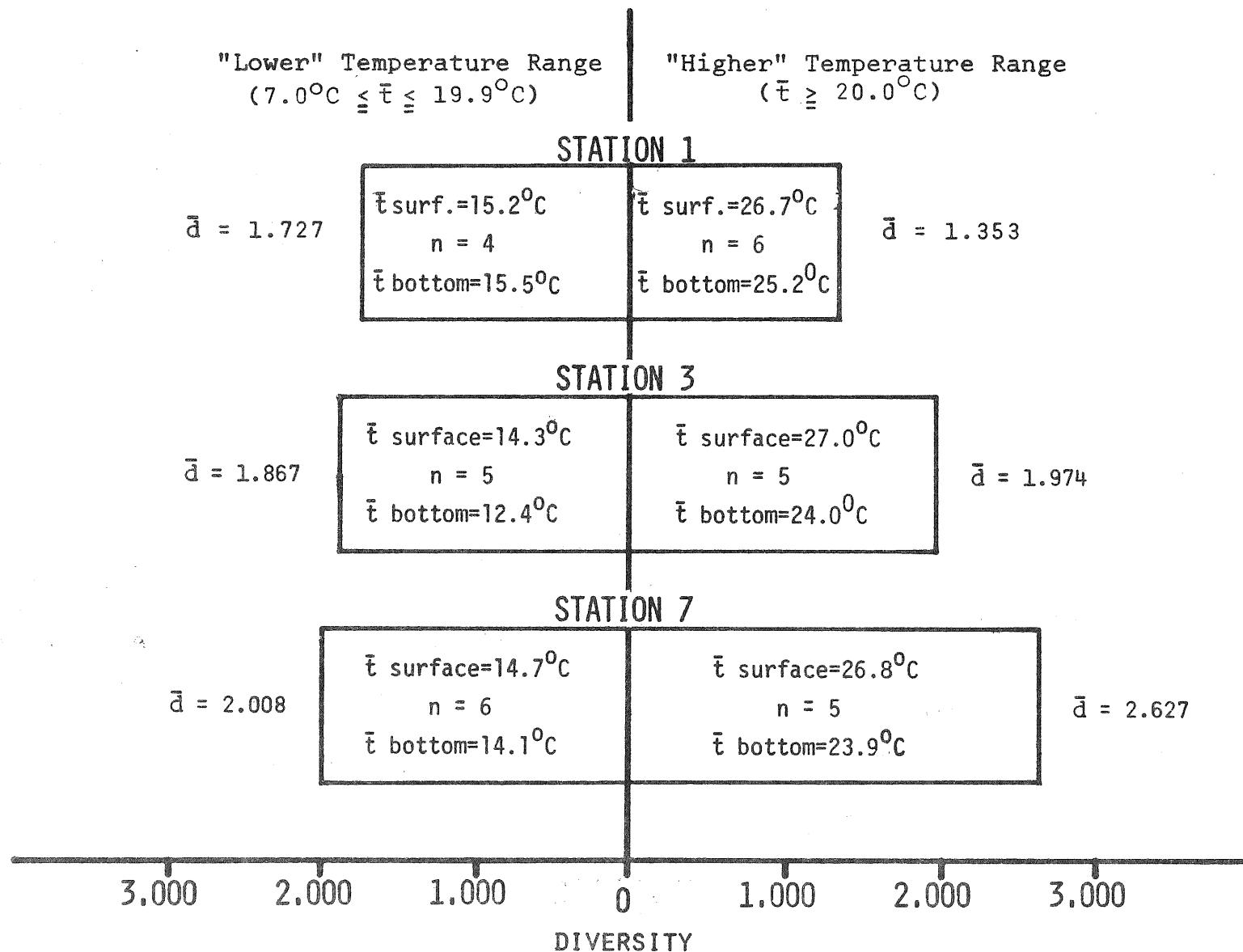


Table 2.5.2-1 Common and scientific names and methods of capture of fish in the Prairie Island area, 1976

Common Name	Scientific Name	Method of Capture					1973	1974	1975
		Trap net	Gillnet	Trawl	Electro-fishing	Seine			
Chestnut lamprey	<i>Ichthyomyzon castaneus</i>				X			X	
Silver lamprey	<i>Ichthyomyzon unicuspis</i>	X		X	X			X	X
Longnose gar	<i>Lepisosteus osseus</i>	X	X		X		X	X	X
Shortnose gar	<i>Lepisosteus platostomus</i>	X	X	X	X	X	X	X	X
Bowfin	<i>Amia calva</i>	X	X		X		X	X	X
American eel	<i>Anquilla rostrata</i>	X					X	X	
Gizzard shad	<i>Dorosoma cepedianum</i>	X	X	X	X	X	X	X	X
Goldeye	<i>Hiodon alosoides</i>	X	X				X	X	X
Mooneye	<i>Hiodon tergisus</i>	X	X		X	X	X	X	X
Northern pike	<i>Esox lucius</i>	X	X		X		X	X	X
Carp	<i>Cyprinus carpio</i>	X	X	X	X	X	X	X	X
Brassy minnow	<i>Hybognathus hankinsoni</i>							X	X
Silvery minnow	<i>Hybognathus nuchalis</i>							X	
Speckled chub	<i>Hybopsis aestivalis</i>					X			
Silver chub	<i>Hybopsis storeriana</i>		X	X	X	X		X	X
Golden shiner	<i>Notemigonus crysoleucas</i>							X	
Emerald shiner	<i>Notropis atherinoides</i>			X	X	X		X	X
River shiner	<i>Notropis biennius</i>				X	X		X	X
Common shiner	<i>Notropis cornutus</i>							X	X
Pugnose minnow	<i>Notropis emiliae</i>				X	X		X	X
Blacknose shiner	<i>Notropis heterolepis</i>							X	
Spottail shiner	<i>Notropis hudsonius</i>			X	X	X		X	X
Red shiner	<i>Notropis lutrensis</i>								X
Rosyface shiner	<i>Notropis rubellus</i>							X	X
Spotfin shiner	<i>Notropis spilopterus</i>				X	X		X	X
Redfin shiner	<i>Notropis umbratilis</i>				X				X
Mimic shiner	<i>Notropis volucellus</i>							X	X
Bluntnose minnow	<i>Pimephales notatus</i>							X	X
Fathead minnow	<i>Pimephales promelas</i>							X	
Bullhead minnow	<i>Pimephales vigilax</i>				X	X		X	X
Carp sucker species	<i>Carpiodes species</i>	X	X		X	X	X	X	X
White sucker	<i>Catostomus commersoni</i>	X			X			X	X
Smallmouth buffalo	<i>Ictiobus bubalus</i>	X	X	X	X	X	X	X	X

Table 2.5.2-1 Continued

Common Name	Scientific Name	Method of Capture					1973	1974	1975
		Trap net	Gill net	Trawl	Elector-fishing	Seine			
Bigmouth buffalo	<i>Ictiobus cypinellus</i>	X	X	X	X		X	X	X
Spotted sucker	<i>Minytrema melanops</i>	X						X	
Silver redhorse	<i>Moxostoma anisurum</i>	X			X	X	X	X	X
River redhorse	<i>Moxostoma carinatum</i>							X	
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	X	X		X	X	X	X	X
Black bullhead	<i>Ictalurus melis</i>	X	X	X				X	X
Yellow bullhead	<i>Ictalurus natalis</i>	X			X		X	X	
Brown bullhead	<i>Ictalurus nebulosus</i>	X	X				X	X	X
Channel catfish	<i>Ictalurus punctatus</i>	X	X	X	X	X	X	X	X
Tadpole madtom	<i>Noturus gyrinus</i>			X		X			X
Flathead catfish	<i>Pylodictis olivaris</i>	X	X		X		X	X	X
Trout perch	<i>Percopsis omiscomaycus</i>			X	X	X		X	X
Burbot	<i>Lota lota</i>		X		X			X	X
White bass	<i>Morone chrysops</i>	X	X	X	X	X	X	X	X
Rock bass	<i>Ambloplites rupestris</i>	X	X		X		X	X	X
Green sunfish	<i>Lepomis cyanellus</i>	X	X		X		X	X	X
Pumpkinseed	<i>Lepomis gibbosus</i>						X	X	X
Bluegill	<i>Lepomis macrochirus</i>	X	X	X	X	X	X	X	X
Hybrid sunfish	<i>Lepomis macrochirus</i> X?		X		X	X		X	
Smallmouth bass	<i>Micropterus dolomieu</i>	X	X		X	X	X	X	X
Largemouth bass	<i>Micropterus salmoides</i>	X			X	X	X	X	
White crappie	<i>Pomoxis annularis</i>	X	X	X	X	X	X	X	X
Black crappie	<i>Pomoxis nigromaculatus</i>	X	X	X	X	X	X	X	X
Johnny darter	<i>Etheostoma nigrum</i>			X	X	X		X	X
River darter	<i>Percina shumardi</i>					X			
Yellow perch	<i>Perca flavescens</i>	X	X	X	X	X	X	X	X
Log perch	<i>Percina caprodes</i>				X	X		X	X
Sauger	<i>Stizostedion canadense</i>	X	X	X	X	X	X	X	X
Walleye	<i>Stizostedion vitreum</i>	X	X	X	X	X	X	X	X
	<i>vitreum</i>								
Freshwater drum	<i>Aplodinotus grunniens</i>	X	X	X	X	X	X	X	X

Table 2.5.2-2 Trap net and gill net stations
used in 1975 and 1976

Trap net	Gill net
0 - 2	0 - 1
0 - 4	0 - 3
0 - 6	0 - 6
0 - 9	0 - 8
1 - 0	1 - 2
1 - 1	1 - 3
1 - 4	1 - 6
1 - 5	1 - 9
1 - 9	
3 - 0	3 - 0
3 - 2	3 - 2
3 - 3	3 - 5
3 - 5	3 - 8
3 - 7	
4 - 1	
4 - 3	
4 - 6	
4 - 7	

Table 2.5.2-3 Descriptions of the five-minute electro-fishing runs used in the Prairie Island discharge electro-fishing study, 1976.

Run #1 - South side of discharge, starts at the east end of the steel wall.	Rock riprap	1-2 m (along shore)
Run #2 - West side of discharge canal.	Sandy muck	1-2 m (along shore)
Run #3 - East side of discharge canal.	Rock riprap	1-2 m (along shore)
Run #4 - East side of Barney's Point.	Mud	0.5 - 1.5 m (along shore)
Run #5 - From NSP's warning bouy in discharge canal to east side of the three small islands.	Sandy muck	3-4 m (middle of discharge)
Run #6 - From northwest end of Barney's Point to north side of discharge, even with small island.	Sandy muck	1-2 m (along shore)
Run #7 Intake along riprap	Rock riprap	1-2 m (along shore)

Table 2.5.2-4 Summary of trap net catches by area, spring 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/lift For 36 lifts	No.	Catch/lift For 20 lifts	No.	Catch/lift For 12 lifts
Silver lamprey	0	-	0	-	0	-
Longnose gar	78	2.17	3	0.15	0	-
Shortnose gar	20	0.56	2	0.10	0	-
Gar spp.	0	-	0	-	1	0.08
Bowfin	15	0.42	0	-	5	0.42
American eel	0	-	0	-	0	-
Gizzard shad	13	0.36	1	0.05	3	0.25
Goldeye	0	-	0	-	0	-
Mooneye	18	0.50	2	0.10	0	-
Northern pike	43	1.19	2	0.10	6	0.50
Carp	226	6.28	165	8.25	42	3.50
Carp sucker spp.	49	1.36	3	0.15	1	0.08
White sucker	0	-	0	-	5	0.42
Smallmouth buffalo	2	0.06	4	0.20	0	-
Bigmouth buffalo	14	0.39	1	0.05	1	0.08
Spotted sucker	0	-	1	0.05	0	-
Silver redhorse	11	0.31	0	-	3	0.25
Shorthead redhorse	67	1.86	11	0.55	2	0.17
Black bullhead	0	-	4	0.20	0	-
Brown bullhead	0	-	0	-	0	-
Yellow bullhead	0	-	0	-	0	-
Bullhead spp.	0	-	0	-	0	-
Channel catfish	7	0.19	2	0.10	0	-
Flathead catfish	2	0.06	4	0.20	2	0.17
White bass	86	2.39	10	0.50	2	0.17
Rock bass	6	0.17	0	-	0	-
Green sunfish	0	-	0	-	0	-
Bluegill	9	0.25	0	-	3	0.25
Smallmouth bass	1	0.03	0	-	0	-
Largemouth bass	1	0.03	0	-	0	-
White crappie	7	0.19	13	0.65	0	-
Black crappie	41	1.14	11	0.55	0	-
Yellow perch	0	-	1	0.05	0	-
Sauger	8	0.22	8	0.40	2	0.17
Walleye	19	0.53	6	0.30	0	-
Freshwater drum	66	1.83	84	4.20	20	1.67
Total	809	22.49	338	16.90	98	8.18

Table 2.5.2-5 Summary of trap net catches by area, summer 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/lift For 36 lifts	No.	Catch/lift For 16 lifts	No.	Catch/lift For 13 lifts
Silver lamprey	0	-	0	-	0	-
Longnose gar	8	0.22	0	-	0	-
Shortnose gar	75	2.08	11	0.69	1	0.08
Gar spp.	0	-	0	-	0	-
Bowfin	9	0.25	0	-	1	0.08
American eel	3	0.08	0	-	0	-
Gizzard shad	12	0.33	1	0.06	1	0.08
Goldeye	0	-	0	-	0	-
Mooneye	16	0.44	0	-	1	0.08
Northern pike	17	0.47	4	0.25	6	0.46
Carp	214	5.94	147	9.19	66	5.08
Carp sucker spp.	30	0.83	2	0.13	0	-
White sucker	0	-	2	0.13	8	0.50
Smallmouth buffalo	15	0.42	4	0.25	1	0.08
Bigmouth buffalo	13	0.36	0	-	0	-
Spotted sucker	0	-	0	-	0	-
Silver redhorse	4	0.11	0	-	1	0.08
Shorthead redhorse	203	5.64	32	2.00	12	0.62
Black bullhead	2	0.06	9	0.56	0	-
Brown bullhead	0	-	0	-	0	-
Yellow bullhead	0	-	0	-	0	-
Bullhead spp.	2	0.06	0	-	0	-
Channel catfish	3	0.08	5	0.31	1	0.08
Flathead catfish	1	0.03	2	0.13	0	-
White bass	202	5.61	29	1.81	18	1.38
Rock bass	8	0.22	1	0.06	0	-
Green sunfish	0	-	0	-	0	-
Bluegill	4	0.11	8	0.50	3	0.23
Smallmouth bass	0	-	2	0.13	0	-
Largemouth bass	0	-	0	-	0	-
White crappie	23	0.64	35	2.19	4	0.31
Black crappie	122	3.39	16	1.00	12	0.92
Yellow perch	2	0.06	0	-	1	0.08
Sauger	32	0.89	3	0.19	4	0.31
Walleye	14	0.39	0	-	10	0.77
Freshwater drum	378	10.50	216	13.50	48	3.69
Total	1412	39.21	529	33.08	199	15.31

Table 2.5.2-6

Summary of trap net catches by area, fall 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/lift For 36 lifts	No.	Catch/lift For 19 lifts	No.	Catch/lift For 14 lifts
Silver lamprey	0	-	0	-	1	0.07
Longnose gar	1	0.03	0	-	0	-
Shortnose	8	0.22	0	-	0	-
Gar spp.	0	-	0	-	0	-
Bowfin	4	0.11	0	-	0	-
American eel	0	-	0	-	0	-
Gizzard shad	179	4.97	43	2.26	7	0.50
Goldeye	1	0.03	0	-	0	-
Mooneye	1	0.03	1	0.05	0	-
Northern pike	24	0.66	5	0.26	4	0.29
Carp	262	7.28	65	3.42	119	8.50
Carp sucker spp.	5	0.14	1	0.05	1	0.07
White sucker	2	0.06	0	-	1	0.07
Smallmouth buffalo	0	-	1	0.05	1	0.07
Bigmouth buffalo	4	0.11	1	0.05	0	-
Spotted sucker	0	-	0	-	0	-
Silver redhorse	3	0.08	0	-	0	-
Shorthead redhorse	159	4.42	44	2.32	8	0.58
Black bullhead	5	0.14	15	0.79	0	-
Brown bullhead	0	-	1	0.05	0	-
Yellow bullhead	0	-	0	-	1	0.07
Bullhead spp.	0	-	0	-	0	-
Channel catfish	0	-	1	0.05	0	-
Flathead catfish	0	-	1	0.05	0	-
White bass	326	9.10	71	3.74	30	2.14
Rock bass	3	0.08	0	-	0	-
Green sunfish	0	-	1	0.05	0	-
Bluegill	16	0.44	30	1.58	8	0.58
Smallmouth bass	0	-	0	-	0	-
Largemouth bass	0	-	1	0.05	0	-
White crappie	36	1.00	67	3.53	5	0.36
Black crappie	135	3.75	53	2.79	8	0.58
Yellow perch	0	-	1	0.05	0	-
Sauger	36	1.00	15	0.79	21	1.50
Walleye	19	0.53	13	0.68	6	0.43
Freshwater drum	204	5.67	234	12.32	41	2.93
Total	1433	39.81	665	35.00	262	18.71

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas- 1976

Total Length in Centimeters	Longnose gar Spring	Longnose gar Summer	Longnose gar Fall	Longnose gar Total	Shortnose gar Spring	Shortnose gar Summer	Shortnose gar Fall	Shortnose gar Total	Gar spp. Spring*
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9					2	8	2	12	
55.0 - 59.9					8	35	4	47	
60.0 - 64.9					5	25	1	31	
65.0 - 69.9	4	1		5	1	8		9	
70.0 - 74.9	9	4		13	3	2		5	
75.0 - 79.9	13	1		14					
80.0 - 84.9	6	1	1	8					
85.0 - 89.9	2			2					
90.0 - 94.9	1			1					
95.0 - 99.9									
100.0 - +									
Others not meas.	46	1	0	47	3	9	1	13	1
Total unmeasured	46	1	0	47	3	9	1	13	1
Total measured	35	7	1	43	19	78	7	104	0
Grand total	81	8	1	90	22	87	8	117	1

* This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Bowfin Spring	Bowfin Summer	Bowfin Fall	Bowfin Total	American eel Summer*	Gizzard shad Spring	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total
Y/Y not meas.								1	1
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9							1		1
14.0 - 15.9							1	7	8
16.0 - 17.9								56	56
18.0 - 19.9								76	76
20.0 - 21.9						2	1	32	35
22.0 - 23.9								6	6
24.0 - 25.9						2	2		4
26.0 - 27.9			1	1					
28.0 - 29.9							3		3
30.0 - 31.9							2	1	3
32.0 - 33.9		1				1	2	2	5
34.0 - 35.9						2		1	3
36.0 - 37.9						2			2
38.0 - 39.9						3			3
40.0 - 44.9						2			2
45.0 - 49.9	1			3					
50.0 - 54.9	2	1	2	3					
55.0 - 59.9	7	2		10					
60.0 - 64.9	5	5	1	10					
65.0 - 69.9	3	1		4					
70.0 - 74.9	1			1					
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	0	0	1	3	3	2	47	52
Total unmeasured	1	0	0	1	3	3	2	48	53
Total measured	19	10	4	33	0	14	12	181	207
Grand total	20	10	4	34	3	17	14	229	260

* This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Goldeye	Mooneye	Mooneye	Mooneye	Mooneye	Northern pike	Northern pike	Northern pike	Northern pike
	Fall*	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9		5	1		6				
32.0 - 33.9		11	12	2	25				
34.0 - 35.9		3	4		7				
36.0 - 37.9									
38.0 - 39.9		1			1		1		1
40.0 - 44.9	1					9	2	2	13
45.0 - 49.9						6	4		10
50.0 - 54.9						3	1	5	9
55.0 - 59.9						5	3	3	11
60.0 - 64.9						4	4	4	12
65.0 - 69.9						5		2	7
70.0 - 74.9						2	3	2	7
75.0 - 79.9						9	4	4	17
80.0 - 84.9						3	2	4	9
85.0 - 89.9						3		1	4
90.0 - 94.9							1	2	3
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	2	2	4	8
Total unmeasured	0	0	0	0	0	2	2	4	8
Total measured	1	20	17	2	39	49	25	29	103
Grand total	1	20	17	2	39	51	27	33	111

* This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas -1976

Total Length in Centimeters	Carp	Carp	Carp	Carp	Carp sucker spp.	Carp sucker spp.	Carp sucker spp.	Carp sucker spp.	White sucker
	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9					2			2	
18.0 - 19.9			3	3	3	1		4	
20.0 - 21.9			3	3					
22.0 - 23.9									
24.0 - 25.9			2	2			1	1	
26.0 - 27.9						1	1	2	
28.0 - 29.9	1			1	2			2	
30.0 - 31.9		1		1		2		2	
32.0 - 33.9	1	1		2			1	1	
34.0 - 35.9	2	1	1	4	5	1		6	
36.0 - 37.9	3	3		6	2	3		5	
38.0 - 39.9	13	4	2	19	5	1	1	7	
40.0 - 44.9	59	70	45	174	10	5	1	16	4
45.0 - 49.9	107	134	141	382	14	9		23	1
50.0 - 54.9	89	123	133	345	3	7	1	11	
55.0 - 59.9	66	55	74	211	3	2		5	
60.0 - 64.9	46	18	19	83			1	1	
65.0 - 69.9	15	8	9	32					
70.0 - 74.9	2		2	4					
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	29	9	12	50	4	0	0	4	0
Total unmeasured	29	9	12	50	4	0	0	4	0
Total measured	404	418	434	1255	49	32	7	88	5
Grand total	433	427	446	1306	53	32	7	91	5

Table 2.5.2- 7 Length-frequency of fishes caught in trap nets in all areas- 1976

Total Length in Centimeters	White sucker Summer	White sucker Fall	White sucker Total	Smallmouth buffalo Spring	Smallmouth buffalo Summer	Smallmouth buffalo Fall	Smallmouth buffalo Total	Bigmouth buffalo Spring	Bigmouth buffalo Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9					1		1		
18.0 - 19.9				1			1		
20.0 - 21.9				1	1		2		
22.0 - 23.9					4		4		
24.0 - 25.9					4		4		
26.0 - 27.9					3		3		
28.0 - 29.9					1		1		
30.0 - 31.9					1		1		
32.0 - 33.9						2	2		
34.0 - 35.9				1			1		
36.0 - 37.9	1		1		1		1		
38.0 - 39.9	1		1	1			1		
40.0 - 44.9	7		7		1		1	2	
45.0 - 49.9		3	3	1	1		2	7	3
50.0 - 54.9	1		1		1		1	3	5
55.0 - 59.9				1			1	3	3
60.0 - 64.9								1	
65.0 - 69.9									2
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	1	0	1	0	0
Total unmeasured	0	0	0	0	1	0	1	0	0
Total measured	10	3	13	6	19	2	27	16	13
Grand total	10	3	13	6	20	2	28	16	13

Table 2.5.2- 7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Bigmouth buffalo	Bigmouth buffalo	Spotted sucker	Silver redhorse	Silver redhorse	Silver redhorse	Silver redhorse	Shorthead redhorse	Shorthead redhorse
	Fall	Total	Spring*	Spring	Summer	Fall	Total	Spring	Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									1
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9								2	
26.0 - 27.9								1	1
28.0 - 29.9								2	3
30.0 - 31.9								2	7
32.0 - 33.9								5	18
34.0 - 35.9								6	21
36.0 - 37.9								7	32
38.0 - 39.9								12	36
40.0 - 44.9		2	1					25	101
45.0 - 49.9		10		2			2	17	23
50.0 - 54.9	3	11		7	2	1	10		2
55.0 - 59.9	1	7		5	3	1	9		
60.0 - 64.9		1				1	1	1	
65.0 - 69.9	1	3							
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	2
Total unmeasured	0	0	0	0	0	0	0	0	2
Total measured	5	34	1	14	5	3	22	80	245

* This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Shorthead redhorse	Shorthead redhorse	Black bullhead	Black bullhead	Black bullhead	Black bullhead	Yellow bullhead	Brown bullhead	Bullhead spp.
	Fall	Total	Spring	Summer	Fall	Total	Fall*	Fall*	Summer*
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9		1		1		1			
20.0 - 21.9			1	3		4			2
22.0 - 23.9			1		1	2			
24.0 - 25.9	3	5	1	2	4	7			
26.0 - 27.9	2	4	1	3	2	6			
28.0 - 29.9	1	6		2	6	8	1		
30.0 - 31.9	6	15			5	5			
32.0 - 33.9	9	32			2	2		1	
34.0 - 35.9	14	41							
36.0 - 37.9	14	53							
38.0 - 39.9	28	76							
40.0 - 44.9	93	219							
45.0 - 49.9	35	75							
50.0 - 54.9	4	6							
55.0 - 59.9									
60.0 - 64.9		1							
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	2	4	0	0	0	0	0	0	0
Total unmeasured	2	4	0	0	0	0	0	0	0
Total measured	209	534	4	11	20	35	1	1	2
Grand total	211	538	4	11	20	35	1	1	2

* This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Channel catfish	Channel catfish	Channel catfish	Channel catfish	Flathead catfish	Flathead catfish	Flathead catfish	Flathead catfish	White bass
	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									2
26.0 - 27.9						1		1	2
28.0 - 29.9									3
30.0 - 31.9		1	1	2					10
32.0 - 33.9									11
34.0 - 35.9		1		1					12
36.0 - 37.9		2		2					33
38.0 - 39.9	2	1		3					16
40.0 - 44.9	3	2		5	1			1	7
45.0 - 49.9	2			2	1	2		2	1
50.0 - 54.9	1	2		3	1			1	
55.0 - 59.9	1			1	2			2	
60.0 - 64.9					1		1	2	
65.0 - 69.9									
70.0 - 74.9					1			1	
75.0 - 79.9									
80.0 - 84.9					1			1	
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	1
Total unmeasured	0	0	0	0	0	0	0	0	1
Total measured	9	9	1	19	8	3	1	12	97
Grand total	9	9	1	19	8	3	1	12	98

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	White bass Summer	White bass Fall	White bass Total	Rock bass Spring	Rock bass Summer	Rock bass Fall	Rock bass Total	Green sunfish Fall*	Bluegill Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9		9	9						1
14.0 - 15.9		5	5		3	1	4	1	3
16.0 - 17.9		3	3		3	1	4		3
18.0 - 19.9	11		11	5		1	6		2
20.0 - 21.9	28	1	29	1	1		2		2
22.0 - 23.9	14	32	46		1		1		1
24.0 - 25.9	3	35	40						
26.0 - 27.9	12	5	19						
28.0 - 29.9	29	26	58						
30.0 - 31.9	50	65	125						
32.0 - 33.9	17	47	75						
34.0 - 35.9	41	63	116						
36.0 - 37.9	26	81	140						
38.0 - 39.9	12	36	64						
40.0 - 44.9	1	12	20						
45.0 - 49.9			1						
50.0 - 54.9									
55.0 - 59.9	1		1						
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	4	7	12	0	1	0	1	0	0
Total unmeasured	4	7	12	0	1	0	1	0	0
Total measured	245	420	762	6	8	3	17	1	12
Grand total	249	427	774	6	9	3	18	1	12

*This species was caught during only one season

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Bluegill	Bluegill	Bluegill	Smallmouth bass	Smallmouth bass	Smallmouth bass	Largemouth bass	Largemouth bass	Largemouth bass
	Summer	Fall	Total	Spring	Summer	Total	Spring	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9	1	1	2						
12.0 - 13.9	1	6	8						
14.0 - 15.9	3	9	15						
16.0 - 17.9	4	14	21						
18.0 - 19.9	5	15	22						
20.0 - 21.9	1	9	12						
22.0 - 23.9			1				1		1
24.0 - 25.9									
26.0 - 27.9								1	1
28.0 - 29.9					1	1			
30.0 - 31.9									
32.0 - 33.9					1	1			
34.0 - 35.9									
36.0 - 37.9				1					
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	15	54	81	1	2	3	1	1	2
Grand total	15	54	81	1	2	3	1	1	2

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	White crappie Spring	White crappie Summer	White crappie Fall	White crappie Total	Black crappie Spring	Black crappie Summer	Black crappie Fall	Black crappie Total	Yellow perch Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9			1	1	1			1	
12.0 - 13.9	1		3	4		23	1	24	
14.0 - 15.9		9	2	11	10	30	55	95	
16.0 - 17.9	1	30	25	56	11	2	60	73	
18.0 - 19.9	1	4	39	44	5	34	11	50	
20.0 - 21.9	3	4	10	17	7	20	22	49	
22.0 - 23.9	3	5	3	11	9	11	22	42	1
24.0 - 25.9	3		6	9	2	21	11	34	
26.0 - 27.9	3	5	6	14	2	1	10	13	
28.0 - 29.9	1	3	7	11	2	5	1	8	
30.0 - 31.9	2		4	6	2			2	
32.0 - 33.9	1		2	3					
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2	0	3	1	3	3	7	0
Total unmeasured	1	2	0	3	1	3	3	7	0
Total measured	19	60	108	187	51	147	193	391	1
Grand total	20	62	108	190	52	150	196	398	1

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas -1976

Total Length in Centimeters	Yellow perch Summer	Yellow perch Fall	Yellow perch Total	Sauger Spring	Sauger Summer	Sauger Fall	Sauger Total	Walleye Spring	Walleye Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9	1	1	3						
24.0 - 25.9	2		2		1	1	2		
26.0 - 27.9									
28.0 - 29.9				2		1	3		1
30.0 - 31.9				2	5	2	9		1
32.0 - 33.9				2	9	6	17	2	
34.0 - 35.9				4	3	13	20		
36.0 - 37.9				3	5	5	13		1
38.0 - 39.9				1	3	13	17	3	
40.0 - 44.9					6	22	28	4	5
45.0 - 49.9					2	5	7	6	9
50.0 - 54.9				1		3	4	7	4
55.0 - 59.9						1	1		1
60.0 - 64.9								2	1
65.0 - 69.9								1	
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	3	5	0	8	0	1
Total unmeasured	0	0	0	3	5	0	8	0	1
Total measured	3	1	5	15	34	72	121	25	23
Grand total	3	1	5	18	39	72	129	25	24

Table 2.5.2-7 Length-frequency of fishes caught in trap nets in all areas-1976

Total Length in Centimeters	Walleye Fall	Walleye Total	Drum Spring	Drum Summer	Drum Fall	Drum Total			
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9					1	1			
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9					64	64			
16.0 - 17.9			1		129	130			
18.0 - 19.9			1	8	5	14			
20.0 - 21.9			10	18	2	20			
22.0 - 23.9			30	30	7	67			
24.0 - 25.9			20	79	21	120			
26.0 - 27.9			18	130	34	182			
28.0 - 29.9	1	2	16	98	39	153			
30.0 - 31.9	3	4	20	72	35	127			
32.0 - 33.9	5	7	18	51	30	99			
34.0 - 35.9	1	1	13	31	21	65			
36.0 - 37.9	1	2	10	27	4	41			
38.0 - 39.9	3	6	5	12	6	23			
40.0 - 44.9	1	10	4	10	8	22			
45.0 - 49.9	7	22	3	1	4	8			
50.0 - 54.9	9	20		1	1	2			
55.0 - 59.9	3	4		1	1	2			
60.0 - 64.9		3	1			1			
65.0 - 69.9	1	2							
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	3	4	0	73	67	140			
Total unmeasured	3	4	0	73	67	140			
Total measured	35	83	170	569	412	1151			
Grand total	38	87	170	642	479	1291			

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Goldeye Fall	Goldeye Total	Mooneye Spring	Mooneye Fall	Mooneye Total	Northern pike Spring	Northern pike Fall	Northern pike Total	Carp Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9			1		1				
16.0 - 17.9		1			1				
18.0 - 19.9		1	1		1				
20.0 - 21.9			1		1				
22.0 - 23.9				1	1				
24.0 - 25.9						1		1	
26.0 - 27.9		1							
28.0 - 29.9	2	2	4		4	2		2	
30.0 - 31.9	2	2	11	1	12	1		1	1
32.0 - 33.9		1	15		15	2		2	1
34.0 - 35.9	1	10	7	1	8	1		1	8
36.0 - 37.9		3	1		1	1		1	9
38.0 - 39.9	3	5					1	1	15
40.0 - 44.9	1	1				4		4	44
45.0 - 49.9						2	2	4	56
50.0 - 54.9						5	4	9	29
55.0 - 59.9						12	6	18	13
60.0 - 64.9						8	4	12	5
65.0 - 69.9						2	4	6	
70.0 - 74.9						4	1	5	
75.0 - 79.9						2	1	3	
80.0 - 84.9							1	1	
85.0 - 89.9							1	1	
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	2	0	2	1
Total unmeasured	0	0	0	0	0	2	0	2	1
Total measured	9	27	41	3	44	47	25	72	181
Grand total	9	27	41	3	44	49	25	74	182

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Carp	Carp	Silver	Carp sucker	Small- mouth buffalo	Small- mouth buffalo	Small- mouth buffalo	Bigmouth buffalo	Bigmouth buffalo
	Fall	Total	Fall*	Spring	Spring	Fall	Total	Spring	Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									1
12.0 - 13.9						1	1		
14.0 - 15.9				1		3	3		4
16.0 - 17.9			5	3		3	3		14
18.0 - 19.9						1	1		1
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9				1					
26.0 - 27.9									
28.0 - 29.9				1		1	1		
30.0 - 31.9		1							
32.0 - 33.9		1		1					
34.0 - 35.9		8							
36.0 - 37.9		9		5					
38.0 - 39.9		15		2	1		1		
40.0 - 44.9		44		3	2		2		
45.0 - 49.9	3	59							
50.0 - 54.9	6	35		1				1	
55.0 - 59.9	3	16							
60.0 - 64.9		5							
65.0 - 69.9	2	2							
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	1	0	0	0	0	0	0	0
Total unmeasured	0	1	0	0	0	0	0	0	0
Total measured	14	195	5	18	3	9	12	1	20
Grand Total	14	196	5	18	3	9	12	1	20

* This species was caught during only one season

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Bigmouth buffalo	Shorthead redhorse	Shorthead redhorse	Shorthead redhorse	Black bullhead	Black bullhead	Black bullhead	Brown bullhead	Channel catfish
	Total	Spring	Fall	Total	Spring	Fall	Total	Spring*	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9	1								
12.0 - 13.9									
14.0 - 15.9	4				1		1	1	
16.0 - 17.9	14								
18.0 - 19.9	1				1		1		
20.0 - 21.9		1		1	1	1	2		
22.0 - 23.9		1		1		1	1		
24.0 - 25.9		3		3		2	2		
26.0 - 27.9		2		2				1	
28.0 - 29.9		3		3					
30.0 - 31.9		11		11					
32.0 - 33.9		9		9					1
34.0 - 35.9		4	1	5					1
36.0 - 37.9		7		7					1
38.0 - 39.9		16	2	18					5
40.0 - 44.9		25	1	26					10
45.0 - 49.9		6		6					5
50.0 - 54.9	1								
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	2
Total unmeasured	0	0	0	0	0	0	0	0	2
Total measured	21	88	4	92	3	4	7	2	23
Grand total	21	88	4	92	3	4	7	2	25

* This species was caught during only one season

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Flathead	Burbot	White bass	White bass	White bass	Rock bass	Rock bass	Rock bass	Green sunfish
	Spring*	Fall*	Spring	Fall	Total	Spring	Fall	Total	Fall*
Y/Y not meas.				225	225				
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9				6	6				
12.0 - 13.9			8	167	175	1	2	3	1
14.0 - 15.9			3	34	37	4	1	5	
16.0 - 17.9				1	1				
18.0 - 19.9			1		1	1		1	
20.0 - 21.9			4		4	1		1	
22.0 - 23.9			7		7				
24.0 - 25.9			5	1	6				
26.0 - 27.9			13	1	14				
28.0 - 29.9			9		9				
30.0 - 31.9			5	3	8				
32.0 - 33.9			10	3	13				
34.0 - 35.9			9	3	12				
36.0 - 37.9			5	3	8				
38.0 - 39.9			1	4	5				
40.0 - 44.9		1							
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9	1								
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	1	225	226	0	0	0	0
Total unmeasured	0	0	1	225	226	0	0	0	0
Total measured	1	1	80	226	306	7	3	10	1
Grand total	1	1	81	451	532	7	3	10	1

* This species was caught during only one season

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Bluegill	Bluegill	Bluegill	Hybrid sunfish	Smallmouth bass	White crappie	White crappie	White crappie	Black crappie
	Spring	Fall	Total	Fall*	Fall*	Spring	Fall	Total	Spring
Y/Y not meas.							16	16	
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									1
10.0 - 11.9						3	53	56	2
12.0 - 13.9	1	1	2	1	1	1	31	32	4
14.0 - 15.9		3	3				8	8	9
16.0 - 17.9						3	1	4	
18.0 - 19.9		3	3				4	4	
20.0 - 21.9		1	1				1	1	4
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									1
28.0 - 29.9							6	6	
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	16	16	0
Total unmeasured	0	0	0	0	0	0	16	16	0
Total measured	1	8	9	1	1	7	104	111	21
Grand total	1	8	9	1	1	7	120	127	21

* This species was caught during only one season

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Black crappie Fall	Black crappie Total	Yellow perch Spring	Yellow perch Fall	Yellow perch Total	Sauger Spring	Sauger Fall	Sauger Total	Walleye Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9	3	4							
10.0 - 11.9	13	15							
12.0 - 13.9	2	6							
14.0 - 15.9	13	22	1	2	3				
16.0 - 17.9	12	12		2	2				
18.0 - 19.9			1	2	3				
20.0 - 21.9	3	7	2		2				
22.0 - 23.9	2	2	1	1	2		2	2	2
24.0 - 25.9	1	1					2	2	
26.0 - 27.9		1				9	3	12	
28.0 - 29.9						3	4	7	1
30.0 - 31.9						13	4	17	
32.0 - 33.9						12	1	13	1
34.0 - 35.9						10	2	12	
36.0 - 37.9						9	3	12	6
38.0 - 39.9						6	5	11	1
40.0 - 44.9						7	7	14	11
45.0 - 49.9						10	4	14	15
50.0 - 54.9						1	2	3	2
55.0 - 59.9							1	1	1
60.0 - 64.9									1
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	1	0	1	2	0	2	0
Total unmeasured	0	0	1	0	1	2	0	2	0
Total measured	49	70	5	7	12	80	40	120	41
Grand total	49	70	6	7	13	82	40	122	41

Table 2.5.2-9 Length-frequency of fishes caught in gill nets in all areas - 1976

Total Length in Centimeters	Walleye Fall	Walleye Total	Fresh- water drum Spring	Fresh- water drum Fall	Fresh- water drum Total				
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9			1	2	3				
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9	2	2							
20.0 - 21.9			3		3				
22.0 - 23.9		2	14		14				
24.0 - 25.9	1	1	8		8				
26.0 - 27.9			1		1				
28.0 - 29.9	1	2	1		1				
30.0 - 31.9	1	1	1		1				
32.0 - 33.9		1	6		6				
34.0 - 35.9			4	1	5				
36.0 - 37.9	1	7							
38.0 - 39.9		1							
40.0 - 44.9	1	12							
45.0 - 49.9		15							
50.0 - 54.9		2							
55.0 - 59.9		1							
60.0 - 64.9		1							
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0				
Total unmeasured	0	0	0	0	0				
Total measured	7	48	39	3	42				
Grand total	7	48	39	3	42				

Table 2.5.2-10

Summary of day electro-fishing catches by area, spring 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/Hour For 7.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.
Lake sturgeon	0	-	0	-	1	0.40
Longnose gar	1	0.13	1	0.40	0	-
Shortnose gar	0	-	2	0.80	0	-
Bowfin	1	0.13	1	0.40	0	-
Gizzard shad	36	4.80	80	32.00	15	6.00
Mooneye	0	-	1	0.40	0	-
Northern pike	1	0.13	0	-	3	1.20
Carp	148	19.73	107	42.80	46	18.40
Silver chub	7	0.93	8	3.20	0	-
Emerald shiner	53	7.07	21	8.40	95	38.00
Pugnose minnow	0	-	1	0.40	0	-
Spottail shiner	3	0.40	2	0.80	0	-
Rosyface shiner	0	-	0	-	3	1.20
Spotfin shiner	1	0.13	3	1.20	0	-
Redfin shiner	5	0.67	0	-	0	-
Bullhead minnow	5	0.67	11	4.40	0	-
Carp sucker spp.	1	0.13	10	4.00	3	1.20
Smallmouth buffalo	2	0.27	9	3.60	1	0.40
Bigmouth buffalo	0	-	0	-	1	0.40
Silver redhorse	3	0.40	0	-	0	-
Shorthead redhorse	74	9.87	26	10.40	79	31.60
Channel catfish	0	-	5	2.40	5	2.00
Flathead catfish	0	-	3	1.20	1	0.40
Trout perch	1	0.13	0	-	0	-
Burbot	0	-	0	-	1	0.40
White bass	223	29.73	65	26.00	90	36.00
Rock bass	4	0.53	14	5.60	21	8.40
Green sunfish	0	-	4	1.60	1	0.40
Bluegill	14	1.87	72	28.80	13	5.20
Hybrid sunfish	1	0.13	1	0.40	0	-
Smallmouth bass	19	2.53	20	8.00	16	6.40
Largemouth bass	0	-	1	0.40	1	0.40
White crappie	0	-	2	0.80	2	0.80
Black crappie	3	0.40	4	1.60	1	0.40
Johnny darter	2	0.27	1	0.40	0	-
Yellow perch	17	2.27	5	2.00	3	1.20
Log perch	7	0.93	3	1.20	1	0.40
Sauger	28	3.73	1	0.40	8	3.20
Walleye	8	1.07	7	2.80	12	4.80
Freshwater drum	59	7.87	16	6.40	7	2.80
Total	727	96.93	508	203.20	430	172.00

Table 2.5.2-11

Summary of day electro-fishing catches by area, summer 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/Hour For 7.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.
Silver lamprey	2	0.27	2	0.80	0	-
Longnose gar	0	-	0	-	0	-
Shorthose gar	0	-	1	0.40	1	0.40
Bowfin	3	0.40	0	-	0	-
Gizzard shad	177	23.60	135	54.00	74	29.60
Mooneye	3	0.40	0	-	1	0.40
Northern pike	0	-	0	-	1	0.40
Carp	194	25.87	74	29.60	100	40.00
Silver chub	17	2.27	5	2.00	6	2.40
Emerald shiner	22	2.93	7	2.80	6	2.40
River shiner	1	0.13	1	0.40	1	0.40
Spottail shiner	21	2.80	1	0.40	0	-
Spotfin shiner	1	0.13	0	-	0	-
Bullhead minnow	3	0.40	6	2.40	0	-
Carp sucker spp.	4	0.53	2	0.80	6	2.40
White sucker	1	0.13	0	-	0	-
Smallmouth buffalo	3	0.40	11	4.40	1	0.40
Bigmouth buffalo	1	0.13	0	-	0	-
Shorthead redhorse	39	5.20	5	2.00	53	21.20
Yellow bullhead	0	-	0	-	1	0.40
Channel catfish	3	0.40	27	10.80	16	6.40
Flathead catfish	0	-	4	1.60	6	2.40
White bass	116	15.47	59	23.60	137	54.80
Rock bass	3	0.40	8	3.20	27	10.80
Green sunfish	3	0.40	5	2.00	4	1.60
Bluegill	28	3.73	29	11.60	64	25.60
Smallmouth bass	15	2.00	16	6.40	29	11.60
Largemouth bass	0	-	0	-	5	2.00
White crappie	1	0.13	1	0.40	3	1.20
Black crappie	3	0.40	4	1.60	4	1.60
Yellow perch	5	0.67	4	1.60	0	-
Sauger	25	3.33	0	-	5	2.00
Walleye	9	1.20	3	1.20	25	10.00
Freshwater drum	521	69.47	118	47.20	12	2.08
Total	1224	163.20	528	211.20	588	235.20

Table 2.5.2-12 Summary of day electro-fishing catches by area, fall 1976

Species	Above Plant		Plant Area		Below Lock & Dam 3	
	No.	Catch/Hour For 7.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.	No.	Catch/Hour For 2.50 Hrs.
Chestnut lamprey	0	-	0	-	1	0.40
Silver lamprey	0	-	0	-	2	0.80
Gizzard shad	323	43.07	217	86.80	144	57.60
Northern pike	0	-	1	0.40	5	2.00
Carp	76	10.13	57	22.80	100	40.00
Silver chub	11	1.47	2	0.80	8	3.20
Emerald shiner	268	35.73	12	4.80	51	20.40
River shiner	1	0.13	0	-	1	0.40
Spottail shiner	17	2.27	2	0.80	5	2.00
Spotfin shiner	1	0.13	1	0.40	0	-
Bullhead minnow	15	2.00	2	0.80	0	-
Carp sucker spp.	2	0.27	6	2.40	22	8.80
White sucker	4	0.53	0	-	3	1.20
Smallmouth buffalo	2	0.27	2	0.80	1	0.40
Bigmouth buffalo	1	0.13	3	1.20	0	-
Silver redhorse	0	-	0	-	1	0.40
Shorthead redhorse	16	2.13	5	2.00	23	9.30
Channel catfish	0	-	4	1.60	11	4.44
Flathead catfish	0	-	3	1.20	0	-
White bass	64	8.53	47	18.80	83	33.20
Rock bass	4	0.53	4	1.60	41	16.40
Green sunfish	7	0.93	19	7.60	1	0.40
Bluegill	69	9.20	129	51.60	128	51.20
Hybrid sunfish	3	0.40	4	1.60	0	-
Smallmouth bass	17	2.27	13	5.20	18	7.20
Largemouth bass	0	-	1	0.40	8	3.20
White crappie	0	-	3	1.20	6	2.40
Black crappie	5	0.67	5	2.00	5	2.00
Yellow perch	4	0.53	0	-	1	0.40
Log perch	1	0.13	1	0.40	0	-
Sauger	18	2.40	3	1.20	23	9.20
Walleye	24	3.20	12	4.80	66	26.40
Freshwater drum	25	3.33	11	4.40	23	9.20
Total	978	130.40	569	227.60	776	310.40

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas-1976

Total Length in Centimeters	Chestnut lamprey	Silver lamprey	Silver lamprey	Silver lamprey	Lake sturgeon	Longnose gar	Shortnose gar	Shortnose gar	Shortnose gar
	Fall*	Summer	Fall	Total	Spring*	Spring*	Spring	Summer	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9						1			
12.0 - 13.9		1		1					
14.0 - 15.9									
16.0 - 17.9		2		2					
18.0 - 19.9		1		1					
20.0 - 21.9									
22.0 - 23.9			1	1					
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9			1	1					
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9							1		1
60.0 - 64.9									
65.0 - 69.9							1		1
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +					1				
Others not meas.	1	0	0	0	0	1	0	1	1
Total unmeasured	1	0	0	0	0	1	0	1	1
Total measured	0	4	2	6	1	2	2	0	2
Grand total	1	4	2	6	1	2	2	1	3

* This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas- 1976

Total Length in Centimeters	Bowfin Spring	Bowfin Summer	Bowfin Total	Gizzard shad Spring	Gizzard shad Summer	Gizzard shad Fall	Gizzard shad Total	Mooneye Spring	Mooneye Summer
Y/Y not meas.					54	238	292		
0.1 - 1.9									
2.0 - 3.9				12			12		
4.0 - 5.9				44			44		
6.0 - 7.9				35	12		47		
8.0 - 9.9				3	15	4	22		
10.0 - 11.9					39	18	57		
12.0 - 13.9					123	51	174		
14.0 - 15.9					111	130	241		1
16.0 - 17.9				1	25	147	171		
18.0 - 19.9				2		68	70		
20.0 - 21.9				6		21	27		
22.0 - 23.9				9		3	12		1
24.0 - 25.9				14	1	1	16		
26.0 - 27.9				3	2		5		
28.0 - 29.9				2	3	1	6		
30.0 - 31.9						1	1	1	
32.0 - 33.9									
34.0 - 35.9						1	1		2
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9	1		1						
50.0 - 54.9	1	1	2						
55.0 - 59.9		1	1						
60.0 - 64.9		1	1						
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	1	0	1	0	0
Total unmeasured	0	0	0	0	55	238	293	0	0
Total measured	2	3	5	131	331	446	906	1	4
Grand total	2	3	5	131	386	684	1199	1	4

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas -1976

Total Length in Centimeters	Mooneye Total	Northern Pike Spring	Northern Pike Summer	Northern Pike Fall	Northern Pike Total	Carp Spring	Carp Summer	Carp Fall	Carp Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9							1		1
12.0 - 13.9							1	1	2
14.0 - 15.9	1						9	4	13
16.0 - 17.9							1	2	3
18.0 - 19.9							2		2
20.0 - 21.9								3	3
22.0 - 23.9	1					1		2	3
24.0 - 25.9						2		4	6
26.0 - 27.9								1	1
28.0 - 29.9									
30.0 - 31.9	1					1			1
32.0 - 33.9							1		1
34.0 - 35.9	2					1	1		1
36.0 - 37.9						6	2	2	10
38.0 - 39.9		1			1	5	1	2	8
40.0 - 44.9						74	47	17	138
45.0 - 49.9		1		2	3	122	162	55	339
50.0 - 54.9				2	2	54	87	73	214
55.0 - 59.9		1	1	1	3	25	38	35	98
60.0 - 64.9		1		1	2	7	10	24	41
65.0 - 69.9							4	6	10
70.0 - 74.9								1	1
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	3	1	1	5
Total unmeasured	0	0	0	0	0	3	1	1	5
Total measured	5	4	1	6	11	298	367	232	896
Grand Total	5	4	1	6	11	301	368	233	901

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas-1976

Total Length in Centimeters	Silver chub	Silver chub	Silver chub	Emerald shiner	Emerald shiner	Emerald shiner	Emerald shiner	River shiner	River shiner
	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total	Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9					16	2	1	19	
4.0 - 5.9					16	3	31	50	1
6.0 - 7.9					71	16	53	141	1
8.0 - 9.9	4	2		6	6	14	55	75	1
10.0 - 11.9	11	6		17			4	4	
12.0 - 13.9		19	14	33					
14.0 - 15.9		1	6	7					
16.0 - 17.9			1	1					
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	1	0	1	60	0	187	247	0
Total unmeasured	0	1	0	1	60	0	187	247	0
Total measured	15	28	21	64	109	35	144	289	3
Grand total	15	29	21	65	169	35	331	536	3

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	River shiner	River shiner	Pugnose minnow	Spottail shiner	Spottail shiner	Spottail shiner	Spottail shiner	Rosyface shiner	Spotfin shiner
	Fall	Total	Spring*	Spring	Summer	Fall	Total	Spring*	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	1	1	1	2			2		
4.0 - 5.9		1		2	1		3		
6.0 - 7.9		1			14	7	21	3	2
8.0 - 9.9	1	2		1	7	16	24		1
10.0 - 11.9						1	1		
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	1
Total unmeasured	0	0	0	0	0	0	0	0	1
Total measured	2	5	1	5	22	24	51	3	3
Grand total	2	5	1	5	22	24	51	3	4

* This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas -1976

Total Length in Centimeters	Spotfin shiner	Spotfin shiner	Spotfin shiner	Redfin shiner	Bullhead	Bullhead	Bullhead	Bullhead	Carp- sucker spp.
	Summer	Fall	Total	Spring*	Spring	Summer	Fall	Total	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9							1	1	
4.0 - 5.9					13	3	14	30	
6.0 - 7.9	1	1	4	4	3	6	1	10	
8.0 - 9.9			1	1					
10.0 - 11.9									
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									2
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									2
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									1
36.0 - 37.9									2
38.0 - 39.9									4
40.0 - 44.9									1
45.0 - 49.9									2
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	1	2	0	0	0	1	1	0
Total unmeasured	0	1	2	0	0	0	1	1	0
Total measured	1	1	5	5	16	9	16	41	14
Grand total	1	2	7	5	16	9	17	42	14

* This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas-1976

Total Length in Centimeters	Carp- sucker spp.	Carp- sucker spp.	Carp- sucker spp.	White sucker	White sucker	White sucker	Small- mouth buffalo	Small- mouth buffalo	Small- mouth buffalo
	Summer	Fall	Total	Summer	Fall	Total	Spring	Summer	Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9		2	2						
8.0 - 9.9	1		1					1	
10.0 - 11.9	1		1					2	
12.0 - 13.9	4	1	5	1	1	2		1	1
14.0 - 15.9		7	7		3	3			
16.0 - 17.9		6	6				1		
18.0 - 19.9		4	4				2		
20.0 - 21.9		1	3						
22.0 - 23.9		1	1				2	1	
24.0 - 25.9							1		
26.0 - 27.9			2					2	
28.0 - 29.9		1	1					2	
30.0 - 31.9		1	1					3	
32.0 - 33.9								1	3
34.0 - 35.9		1	2				1		
36.0 - 37.9			2						
38.0 - 39.9	1	1	6				1	1	
40.0 - 44.9	3	4	8				2		
45.0 - 49.9	1		3		3	3	1	1	
50.0 - 54.9							1		1
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	11	30	55	1	7	8	12	15	5
Grand total	11	30	55	1	7	8	12	15	5

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	Small- mouth buffalo	Bigmouth buffalo	Bigmouth buffalo	Bigmouth buffalo	Bigmouth buffalo	Silver redhorse	Silver redhorse	Silver redhorse	Shorthead redhorse
	Total	Spring	Summer	Fall	Total	Spring	Fall	Total	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9	1								
10.0 - 11.9	2								
12.0 - 13.9	2								
14.0 - 15.9				1	1				3
16.0 - 17.9	1								5
18.0 - 19.9	2								1
20.0 - 21.9									1
22.0 - 23.9	3								2
24.0 - 25.9	1								1
26.0 - 27.9	2								5
28.0 - 29.9	2								13
30.0 - 31.9	3								18
32.0 - 33.9	4								27
34.0 - 35.9	1								22
36.0 - 37.9						1		1	19
38.0 - 39.9	2			1	1				19
40.0 - 44.9	2			1	1				32
45.0 - 49.9	2	1		1	2				10
50.0 - 54.9	2					2	1	3	1
55.0 - 59.9			1		1				
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	32	1	1	4	6	3	1	4	179
Grand total	32	1	1	4	6	3	1	4	179

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas -1976

Total Length in Centimeters	Shorthead redhorse	Shorthead redhorse	Shorthead redhorse	Yellow bullhead	Channel catfish	Channel catfish	Channel catfish	Channel catfish	Flathead catfish
	Summer	Fall	Total	Summer*	Spring	Summer	Fall	Total	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9									
8.0 - 9.9									
10.0 - 11.9		2	2						
12.0 - 13.9		2	2			1		1	
14.0 - 15.9			3						
16.0 - 17.9			5	1					1
18.0 - 19.9	3		4						
20.0 - 21.9		1	2						
22.0 - 23.9	2		4						
24.0 - 25.9		1	2						1
26.0 - 27.9	2	3	10			1		1	1
28.0 - 29.9	5		18			1		1	
30.0 - 31.9	6	3	27				1	1	
32.0 - 33.9	17	3	47			2		2	
34.0 - 35.9	18	4	44			1		1	
36.0 - 37.9	12	9	40			2		2	
38.0 - 39.9	8	7	34			4		4	1
40.0 - 44.9	15	7	54		5	12	2	19	
45.0 - 49.9	7	2	19		1	17	8	26	
50.0 - 54.9	1		2		3	4	2	9	
55.0 - 59.9					1		1	2	
60.0 - 64.9						1		1	
65.0 - 69.9									3
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	0	0	0	0	0	1	1	0
Total unmeasured	1	0	0	0	0	0	1	1	0
Total measured	96	44	319	1	10	46	14	70	4
Grand Total	97	44	320	1	10	46	15	71	4

*This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas

Total Length in Centimeters	Flathead catfish	Flathead catfish	Flathead catfish	Trout perch	Burbot	White bass	White bass	White bass	White bass
	Summer	Fall	Total	Spring*	Spring*	Spring	Summer	Fall	Total
Y/Y not meas.						79	56	5	140
0.1 - 1.9									
2.0 - 3.9						17			17
4.0 - 5.9				1		184			184
6.0 - 7.9						40			40
8.0 - 9.9						1	81		82
10.0 - 11.9							80	32	112
12.0 - 13.9							19	87	106
14.0 - 15.9						6		29	34
16.0 - 17.9			1			15		3	18
18.0 - 19.9						3			3
20.0 - 21.9							8	2	10
22.0 - 23.9							6	2	8
24.0 - 25.9			1			2	1	3	6
26.0 - 27.9			1		1	3	3	1	7
28.0 - 29.9	1		1			6	5	3	14
30.0 - 31.9	1		1			4	14	6	24
32.0 - 33.9						4	9	6	19
34.0 - 35.9						6	7	6	19
36.0 - 37.9						6	10	4	20
38.0 - 39.9	1		2			1	2	4	7
40.0 - 44.9	1		1			1			1
45.0 - 49.9	2	1	3						
50.0 - 54.9	1		1						
55.0 - 59.9	1	1	2						
60.0 - 64.9									
65.0 - 69.9	2	1	3						
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	79	56	1	136
Total unmeasured	0	0	0	0	0	79	56	6	141
Total measured	10	3	17	1	1	299	245	188	731
Grand total	10	3	17	1	1	378	301	194	872

* This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas -1976

Total Length in Centimeters	Rock bass Spring	Rock bass Summer	Rock bass Fall	Rock bass Total	Green sunfish Spring	Green sunfish Summer	Green sunfish Fall	Green sunfish Total	Bluegill Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9			1	1		1		1	
6.0 - 7.9	1			1	2		3	5	12
8.0 - 9.9	1	8	11	20	1	4	1	6	16
10.0 - 11.9	2	2	10	15		5	8	13	8
12.0 - 13.9	5	5	4	14	2		7	9	19
14.0 - 15.9	12	7	8	27		2	8	12	16
16.0 - 17.9	6	7	7	20					20
18.0 - 19.9	7	8	6	21					5
20.0 - 21.9	2	1		3					
22.0 - 23.9			1	1					
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	3	0	1	4	0	0	0	0	3
Total unmeasured	3	0	1	4	0	0	0	0	3
Total measured	36	38	48	124	5	12	27	44	96
Grand total	39	38	49	127	5	12	27	44	99

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	Bluegill Summer	Bluegill Fall	Bluegill Total	Hybrid sunfish Spring	Hybrid sunfish Fall	Hybrid sunfish Total	Smallmouth bass Spring	Smallmouth bass Summer	Smallmouth bass Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	10	26	36				5		
6.0 - 7.9	6	85	103						
8.0 - 9.9	5	49	70	1	1	2		2	
10.0 - 11.9	17	31	56		1	1		16	
12.0 - 13.9	9	39	67		3	3	6	1	8
14.0 - 15.9	11	18	45	1	2	3	9	1	4
16.0 - 17.9	31	31	82				2	5	1
18.0 - 19.9	26	33	64				3	6	3
20.0 - 21.9	5	12	17				12	4	5
22.0 - 23.9							1	3	5
24.0 - 25.9							6	3	2
26.0 - 27.9							5	4	3
28.0 - 29.9							2	5	5
30.0 - 31.9							2	4	4
32.0 - 33.9								4	3
34.0 - 35.9							1	1	1
36.0 - 37.9								1	2
38.0 - 39.9									2
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2	6	0	0	0	0	0	0
Total unmeasured	1	2	6	0	0	0	0	0	0
Total measured	120	324	540	2	7	9	54	60	48
Grand total	121	326	546	2	7	9	54	60	48

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	Smallmouth bass	Largemouth bass	Largemouth bass	Largemouth bass	Largemouth bass	White crappie	White crappie	White crappie	White crappie
	Total	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	5								
6.0 - 7.9									
8.0 - 9.9	2								
10.0 - 11.9	16		1	3	4			2	2
12.0 - 13.9	15								
14.0 - 15.9	14			2	2				
16.0 - 17.9	8	1			1		1	1	2
18.0 - 19.9	12							1	1
20.0 - 21.9	21								
22.0 - 23.9	9			1	1	1		1	2
24.0 - 25.9	11			1	1	1	2	1	4
26.0 - 27.9	12	1			1	2	1		3
28.0 - 29.9	12		1		1		1		1
30.0 - 31.9	10							2	2
32.0 - 33.9	7		2	1	3			1	1
34.0 - 35.9	3								
36.0 - 37.9	3		1	1	2				
38.0 - 39.9	2								
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	162	2	5	9	16	4	5	9	18
Grand total	162	2	5	9	16	4	5	9	18

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas -1976

Total Length in Centimeters	Black crappie	Black crappie	Black crappie	Black crappie	Johnny darter	Yellow perch	Yellow perch	Yellow perch	Yellow perch
	Spring	Summer	Fall	Total	Spring*	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9					1				
4.0 - 5.9					2	19			19
6.0 - 7.9	1			1		2			2
8.0 - 9.9			5	5			4	2	6
10.0 - 11.9	3		5	8		1		1	2
12.0 - 13.9	1	1		2		3	1	1	5
14.0 - 15.9		3		3			4		4
16.0 - 17.9	2	1		3					
18.0 - 19.9		1	1	2					
20.0 - 21.9		3		3				1	1
22.0 - 23.9	1		1	2					
24.0 - 25.9		1	3	4					
26.0 - 27.9									
28.0 - 29.9		1		1					
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	8	11	15	34	3	25	9	5	39
Grand total	8	11	15	34	3	25	9	5	39

* This species was caught during only one season.

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	Log perch Spring	Log perch Fall	Log perch Total	Sauger Spring	Sauger Summer	Sauger Fall	Sauger Total	Walleye Spring	Walleye Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	7								
6.0 - 7.9	3			1			1	2	
8.0 - 9.9	1		1					4	
10.0 - 11.9		1	1			1	1		2
12.0 - 13.9						3	3		4
14.0 - 15.9				2		3	5		3
16.0 - 17.9				8		4	12	1	1
18.0 - 19.9				10	1	2	13	2	
20.0 - 21.9				5	5	1	11	4	2
22.0 - 23.9				2	8	1	11	2	
24.0 - 25.9				1	7	12	20	1	
26.0 - 27.9				1	2	7	10		
28.0 - 29.9				3	2	6	11		1
30.0 - 31.9				1		1	2		3
32.0 - 33.9				2	1		3		
34.0 - 35.9					1		1	1	
36.0 - 37.9					3		3		3
38.0 - 39.9						1		1	2
40.0 - 44.9						2	2	1	6
45.0 - 49.9				1			1	2	6
50.0 - 54.9								4	4
55.0 - 59.9								1	
60.0 - 64.9								1	
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	11	1	2	37	30	44	110	27	37
Grand total	11	1	2	37	30	44	110	27	37

Table 2.5.2-13 Length-frequency of fishes caught by day electro-fishing in all areas - 1976

Total Length in Centimeters	Walleye Fall	Walleye Total	Drum Spring	Drum Summer	Drum Fall	Drum Total			
Y/Y not meas.				268		268			
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9			5			5			
6.0 - 7.9		2	1	4		5			
8.0 - 9.9		4		27	1	28			
10.0 - 11.9	1	3		146	4	150			
12.0 - 13.9		4		100	11	111			
14.0 - 15.9	4	7		15	10	25			
16.0 - 17.9	4	6	6	1	5	12			
18.0 - 19.9	6	8	5	1		6			
20.0 - 21.9	7	13	3	3		6			
22.0 - 23.9	2	4	10	4	1	15			
24.0 - 25.9		1	23	8	3	34			
26.0 - 27.9	3	3	9	26	1	36			
28.0 - 29.9	2	3	6	20	4	30			
30.0 - 31.9	5	9	1	14	1	16			
32.0 - 33.9	7	7	6	6	5	17			
34.0 - 35.9	3	4	1	2	4	7			
36.0 - 37.9	3	6	1	3	2	6			
38.0 - 39.9	3	6	2	1	4	7			
40.0 - 44.9	12	19	3	1	2	6			
45.0 - 49.9	16	24		1	1	2			
50.0 - 54.9	13	21							
55.0 - 59.9	6	7							
60.0 - 64.9	2	3							
65.0 - 69.9	2	2							
70.0 - 74.9	1	1							
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	268	0	269			
Total unmeasured	0	0	0	268	0	269			
Total measured	102	167	82	383	59	524			
Grand total	102	167	82	651	59	793			

Table 2.5.2-14

Summary of trawling catches by area, Spring 1976

Species	No.	Above Plant	No.	Plant Area	No.	Total
		Catch/Hour For 0.65 Hrs.		Catch/Hour For 0.63 Hrs.		Catch/Hour For 1.28 Hrs.
Silver lamprey	0	-	1	1.59	1	0.78
Shortnose gar	1	1.54	0	-	1	0.78
Gizzard shad	18	27.69	0	-	18	14.06
Carp	3	4.62	13	20.63	16	12.50
Silver chub	1	1.54	0	-	1	0.78
Emerald shiner	0	-	0	-	0	-
Spottail shiner	5	7.69	0	-	5	3.91
Smallmouth buffalo	1	1.54	2	3.17	3	2.34
Bigmouth buffalo	0	-	1	1.59	1	0.78
Channel catfish	3	4.62	290	460.32	293	228.91
Trout perch	27	41.54	8	12.70	35	27.34
White bass	266	409.23	11	17.46	277	216.41
White crappie	69	106.15	1	1.59	70	54.69
Black crappie	33	50.77	0	-	33	25.78
Johnny darter	0	-	3	4.76	3	2.34
Yellow perch	1	1.54	0	-	1	0.78
Sauger	1	1.54	1	1.59	2	1.56
Walleye	0	-	0	-	0	-
Freshwater drum	51	78.46	246	390.48	297	232.03
Total	480	736.93	577	915.88	1057	825.77

Table 2.5.2- 15 Summary of trawling catches by area, Summer 1976

Species	Above Plant Catch/Hour		Plant Area Catch/Hour		Total Catch/Hour	
	No.	For 0.50 Hr.	No.	For 0.50 Hr.	No.	For 1.00 Hr.
Shortnose gar	2	4.00	0	-	2	2.00
Gizzard shad	19	38.00	11	22.00	30	30.00
Carp	9	18.00	13	26.00	22	22.00
Silver chub	3	6.00	0	-	3	3.00
Gibmouth buffalo	3	6.00	0	-	3	3.00
Black bullhead	15	30.00	0	-	15	15.00
Channel catfish	2	4.00	173	346.00	175	175.00
Trout perch	7	14.00	11	22.00	18	18.00
White bass	34	68.00	0	-	34	34.00
Bluegill	5	10.00	0	-	5	5.00
White crappie	22	44.00	1	2.00	23	23.00
Black crappie	10	20.00	0	-	10	10.00
Johnny darter	3	6.00	0	-	3	3.00
Yellow perch	1	2.00	0	-	1	1.00
Sauger	1	2.00	0	-	1	1.00
Walleye	1	2.00	0	-	1	1.00
Freshwater drum	102	204.00	106	212.00	208	208.00
Total	238	476.00	315	630.00	553	553.00

Table 2.5.2- 16 Summary of trawling catches by area, Fall 1976

Species	<u>Above Plant</u>		<u>Plant Area</u>		<u>Total</u>	
	No.	Catch/Hour For 0.50 Hrs.	No.	Catch/Hour For 0.52 Hrs.	No.	Catch/Hour For 1.02 Hrs.
Gizzard shad	4	8.00	53	101.92	57	55.88
Carp	0	-	3	5.77	3	2.94
Silver chub	1	2.00	0	-	1	0.98
Emerald shiner	7	14.00	0	-	7	6.86
Spottail shiner	1	2.00	0	-	1	0.98
Smallmouth buffalo	1	2.00	0	-	1	0.98
Bigmouth buffalo	1	2.00	0	-	1	0.98
Channel catfish	0	-	2	3.85	2	1.96
Tadpole madtom	0	-	1	1.92	1	0.98
Trout perch	2	4.00	0	-	2	1.96
White bass	6	12.00	2	3.85	8	7.84
Bluegill	7	14.00	1	1.92	8	7.84
White crappie	30	60.00	1	1.92	31	30.39
Black crappie	25	50.00	0	-	25	24.51
Sauger	0	-	1	1.92	1	0.98
Freshwater drum	7	14.00	9	17.31	16	15.69
Total	92	184.00	73	140.38	165	161.76

Table 2.5.2- 17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Silver lamprey	Shortnose gar	Shortnose gar	Shortnose gar	Gizzard shad	Gizzard shad	Gizzard shad	Gizzard shad	Carp
	Spring*	Spring	Summer	Total	Spring	Summer	Fall	Total	Spring
Y/Y not meas.					2		14	16	
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9									
6.0 - 7.9					4		1	5	
8.0 - 9.9					5			5	
10.0 - 11.9					7			7	
12.0 - 13.9						1		1	
14.0 - 15.9						11	1	12	
16.0 - 17.9	1					2	10	12	
18.0 - 19.9						14	13	27	
20.0 - 21.9						2	14	16	
22.0 - 23.9							3	3	
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9							1	1	1
38.0 - 39.9									
40.0 - 44.9									4
45.0 - 49.9									5
50.0 - 54.9									6
55.0 - 59.9		1		1					
60.0 - 64.9									
65.0 - 69.9			2	2					
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	2	0	14	16	0
Total unmeasured	0	0	0	0	2	0	14	16	0
Total measured	1	1	2	3	16	30	43	75	16
Grand total	1	1	2	3	18	30	57	105	16

*This species was caught during only one season.

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Carp Summer	Carp Fall	Carp Total	Silver chub Spring	Silver chub Summer	Silver chub Fall	Silver chub Total	Emerald shiner Fall*	Spottail shiner Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9	1		1						2
6.0 - 7.9								7	
8.0 - 9.9									3
10.0 - 11.9				1	1		2		
12.0 - 13.9					2		2		
14.0 - 15.9						1	1		
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9			1						
38.0 - 39.9									
40.0 - 44.9	1		5						
45.0 - 49.9	6	1	12						
50.0 - 54.9	10	1	17						
55.0 - 59.9	1	1	2						
60.0 - 64.9	3		3						
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	22	3	41	1	3	1	5	7	5
Grand total	22	3	41	1	3	1	5	7	5

*This species was caught during only one season.

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Spottail shiner	Spottail shiner	Small- mouth buffalo	Small- mouth buffalo	Small- mouth buffalo	Bigmouth buffalo	Bigmouth buffalo	Bigmouth buffalo	Bigmouth buffalo
	Fall	Total	Spring	Fall	Total	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9		2							
6.0 - 7.9			1		1				
8.0 - 9.9		3							
10.0 - 11.9	1	1					1		1
12.0 - 13.9				1	1		2		2
14.0 - 15.9								1	1
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9			1		1				
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9			1		1				
50.0 - 54.9						1			1
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	1	6	3	1	4	1	3	1	5
Grand total	1	6	3	1	4	1	3	1	5

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Black bullhead	Channel catfish	Channel catfish	Channel catfish	Channel catfish	Tadpole madtom	Trout perch	Trout perch	Trout perch
	Summer *	Spring	Summer	Fall	Total	Fall*	Spring	Summer	Fall
Y/Y not meas.		157	88		245				
0.1 - 1.9		3			3				
2.0 - 3.9		81	1		82				
4.0 - 5.9		45	19		64	1	33		1
6.0 - 7.9		3	24	1	28			16	
8.0 - 9.9			18	1	19		2	2	
10.0 - 11.9	2		21		21				
12.0 - 13.9			1		1				
14.0 - 15.9	1								
16.0 - 17.9	2	1	1		2				
18.0 - 19.9	4								
20.0 - 21.9	3		1		1				
22.0 - 23.9									
24.0 - 25.9		1			1				
26.0 - 27.9	2								
28.0 - 29.9	1		1		1				
30.0 - 31.9									
32.0 - 33.9		1			1				
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	1	0	0	1	0	0	0	1
Total unmeasured	0	158	88	0	246	0	0	0	1
Total measured	15	135	87	2	224	1	35	18	1
Grand total	15	293	175	2	470	1	35	18	2

*This species was caught during only one season.

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Trout perch	White bass	White bass	White bass	White bass	Bluegill	Bluegill	Bluegill	White crappie
	Total	Spring	Summer	Fall	Total	Summer	Fall	Total	Spring
Y/Y not meas.		216	1		217				28
0.1 - 1.9									
2.0 - 3.9						5		5	4
4.0 - 5.9	34	6			6		1	1	26
6.0 - 7.9	16	48			48		5	5	3
8.0 - 9.9	4	7	3		10		1	1	
10.0 - 11.9			20	1	21		1	1	
12.0 - 13.9			10	6	16				
14.0 - 15.9									6
16.0 - 17.9									3
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9				1					
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	216	1	0	217	0	0	0	28
Total unmeasured	1	216	1	0	217	0	0	0	28
Total measured	54	61	33	8	102	5	8	13	42
Grand total	55	277	34	8	319	5	8	13	70

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	White crappie Summer	White crappie Fall	White crappie Total	Black crappie Spring	Black crappie Summer	Black crappie Fall	Black crappie Total	Johnny darter Spring	Johnny darter Summer
Y/Y not meas.			28						
0.1 - 1.9									
2.0 - 3.9	2		6	4			4	3	
4.0 - 5.9	1		27	13			13		2
6.0 - 7.9	4		7	2	2	2	6		1
8.0 - 9.9	6	9	15		3	14	17		
10.0 - 11.9	4	13	17	3		4	7		
12.0 - 13.9		7	7	9	1	2	12		
14.0 - 15.9	1		7		4	2	6		
16.0 - 17.9	4		7			1	1		
18.0 - 19.9	1	1	2	1			1		
20.0 - 21.9									
22.0 - 23.9				1			1		
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	1	29	0	0	0	0	0	0
Total unmeasured	0	1	29	0	0	0	0	0	0
Total measured	23	30	95	33	10	25	68	3	3
Grand total	23	31	124	33	10	25	68	3	3

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations- 1976

Total Length in Centimeters	Johnny darter	Yellow perch	Yellow perch	Yellow perch	Sauger	Sauger	Sauger	Sauger	Walleye
	Total	Spring	Summer	Total	Spring	Summer	Fall	Total	Summer
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	3								
4.0 - 5.9	2								
6.0 - 7.9	1								
8.0 - 9.9									
10.0 - 11.9									
12.0 - 13.9		1		1					
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9			1	1					
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9							1	1	
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9					1	1		2	1
50.0 - 54.9					1			1	
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	6	1	1	2	2	1	1	4	1
Grand total	6	1	1	2	2	1	1	4	1

Table 2.5.2-17 Length-frequency of fishes caught by trawling at all trawling stations - 1976

Total Length in Centimeters	Freshwater drum	Freshwater drum	Freshwater drum	Freshwater drum					
	Spring	Summer	Fall	Total					
Y/Y not meas.	104	33		137					
0.1 - 1.9	1			1					
2.0 - 3.9	15	2		17					
4.0 - 5.9	41	15		56					
6.0 - 7.9	92	20	1	113					
8.0 - 9.9	23	18	4	45					
10.0 - 11.9	1	12	11	24					
12.0 - 13.9		37		37					
14.0 - 15.9		27		27					
16.0 - 17.9		2		2					
18.0 - 19.9									
20.0 - 21.9	1			1					
22.0 - 23.9		2		2					
24.0 - 25.9	5	4		9					
26.0 - 27.9	4	11		15					
28.0 - 29.9	4	13		17					
30.0 - 31.9	2	5		7					
32.0 - 33.9	3	4		7					
34.0 - 35.9		3		3					
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9	1			1					
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	104	33	0	137					
Total unmeasured	104	33	0	137					
Total measured	193	175	16	384					
Grand total	297	208	16	521					

Table 2.5.2-18

Summary of seining catches by area, spring 1976.

Estimated area seined SPECIES	Above Plant 0.2986 ha		Plant Area 0.0895 ha		Below L & D 3 0.1719 ha	
	NO.	NO/ha	NO	NO/ha	NO	NO/ha
Gizzard shad	25	83.72	95	1061.45	17	98.89
Carp	5	16.74	0	-	1	5.82
Silver chub	7	23.44	5	55.87	3	17.45
Emerald shiner	200	669.79	13	145.25	195	1134.38
River shiner	0	-	0	-	19	110.53
Pugnose minnow	0	-	0	-	1	5.82
Spottail shiner	16	53.58	19	212.29	12	69.81
Spotfin shiner	24	80.38	0	-	0	-
Bullhead minnow	23	77.03	4	44.69	16	93.08
Carp sucker spp.	8	26.79	0	-	0	-
Smallmouth buffalo	0	-	0	-	9	52.36
Silver redhorse	1	3.35	0	-	1	5.82
Shorthead redhorse	1	3.35	1	11.17	0	-
Channel catfish	0	-	8	89.39	1	5.82
Trout perch	3	10.05	0	-	0	-
Tadpole madtom	1	3.35	0	-	0	-
White bass	794	2659.08	263	2938.55	165	959.86
Bluegill	15	50.23	3	33.52	1	5.82
Smallmouth bass	1	3.35	0	-	0	-
White crappie	24	80.38	6	67.04	0	-
Black crappie	4	13.40	0	-	1	5.82
Crappie spp.	6	20.09	0	-	0	-
Johnny darter	1	3.35	0	-	1	5.82
River darter	0	-	0	-	1	5.82
Yellow perch	7	23.44	2	22.35	15	87.26
Log perch	0	-	1	11.17	8	46.54
Sauger	0	-	0	-	4	23.27
Walleye	5	16.74	0	-	10	58.17
Freshwater drum	277	927.66	68	759.78	20	116.35
TOTAL	1448	4849.30	488	5452.51	501	2914.49

Table 2.5.2-19

Summary of seining catches by area, Summer 1976.

Estimated area seined	<u>Above Plant</u> 0.3857 ha		<u>Plant Area</u> 0.1046 ha		<u>Below L & D 3</u> 0.2288 ha	
	NO.	NO/ha	NO.	NO/ha	NO.	NO/ha
SPECIES						
Shortnose gar	0	-	1	9.56	0	-
Gizzard shad	30	77.78	15	143.40	17	74.30
Mooneye	1	2.59	0	-	1	4.37
Carp	2	5.19	1	9.56	3	13.11
Silver chub	10	25.93	0	-	22	96.15
Speckled chub	0	-	0	-	1	4.37
Emerald shiner	104	269.64	173	1653.92	41	179.20
River shiner	0	-	0	-	7	30.59
Spottail shiner	168	435.57	3	28.68	45	196.68
Spotfin shiner	24	62.22	4	38.24	1	4.37
Bullhead minnow	25	64.82	17	162.52	1	4.37
Carp sucker spp.	3	7.78	0	-	22	96.15
Smallmouth buffalo	9	23.33	0	-	0	-
Shorthead redhorse	1	2.59	0	-	5	21.85
Channel catfish	12	31.11	29	277.25	3	13.11
White bass	190	492.61	13	124.28	338	1477.27
Bluegill	16	41.48	34	325.05	1	4.37
Smallmouth bass	1	2.59	0	-	0	-
White crappie	3	7.78	2	19.12	0	-
Black crappie	4	10.37	2	19.12	0	-
Johnny darter	1	2.59	0	-	0	-
Yellow perch	6	15.56	0	-	1	4.37
Log perch	3	7.78	0	-	3	13.11
Sauger	3	7.78	0	-	3	13.11
Walleye	2	5.19	0	-	4	17.48
Freshwater drum	73	189.27	34	325.05	24	104.90
TOTAL	691	1791.55	328	3135.76	543	2373.25

Table 2.5.2- 20 Summary of seining catches by area, fall 1976.

Estimated Area Seined	<u>Above Plant</u>		<u>Plant Area</u>		<u>Below L & D 3</u>	
	<u>0.3119 ha</u>		<u>0.0970 ha</u>		<u>0.2138 ha</u>	
SPECIES	NO.	NO/ha	NO.	NO/ha	NO.	NO/ha
Gizzard shad	2	6.41	10	103.09	153	715.62
Carp	1	3.21	2	20.62	0	-
Silver chub	0	-	0	-	1	4.68
Emerald shiner	261	836.81	17	175.26	12	56.13
River shiner	1	3.21	0	-	15	70.16
Spottail shiner	98	314.20	0	-	51	238.54
Spotfin shiner	5	16.03	2	20.62	0	-
Bullhead minnow	22	70.54	19	195.88	2	9.35
Carp sucker spp.	0	-	0	-	13	60.80
Smallmouth buffalo	0	-	2	20.62	0	-
Channel catfish	0	-	2	20.62	0	-
White bass	11	35.27	1	10.31	17	79.51
Bluegill	8	25.65	32	329.90	20	93.55
Hybrid sunfish	0	-	0	-	2	9.35
Smallmouth bass	0	-	1	10.31	0	-
Largemouth bass	0	-	0	-	1	4.68
Black crappie	0	-	1	10.31	0	-
Log perch	1	3.21	2	20.62	0	-
Sauger	0	-	1	10.31	0	-
Walleye	1	3.21	0	-	0	-
Freshwater drum	0	-	2	20.62	0	-
TOTAL	411	1317.73	94	969.07	287	1342.38

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations- 1976

Total Length in Centimeters	Shortnose gar	Gizzard shad	Gizzard shad	Gizzard shad	Gizzard shad	Mooneye	Carp	Carp	Carp
	Summer*	Spring	Summer	Fall	Total	Summer*	Spring	Summer	Fall
Y/Y not meas.		77		122	199				
0.1 - 1.9									
2.0 - 3.9		14			14		1		
4.0 - 5.9		25	2		27		1		
6.0 - 7.9		14	6		20		1		
8.0 - 9.9		4	10	2	16				
10.0 - 11.9		1	2	1	4				
12.0 - 13.9			18	6	24	1		2	
14.0 - 15.9			13	14	27	1		1	
16.0 - 17.9			8	16	24				1
18.0 - 19.9			2	4	6				
20.0 - 21.9			1		1				
22.0 - 23.9									
24.0 - 25.9		1							
26.0 - 27.9									
28.0 - 29.9		1							
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9								1	1
45.0 - 49.9							2	1	
50.0 - 54.9	1								
55.0 - 59.9								1	1
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	77	0	122	199	0	1	0	0
Total unmeasured	0	77	0	122	199	0	1	0	0
Total measured	1	60	62	43	165	2	5	6	3
Grand total	1	137	62	165	364	2	6	6	3

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations- 1976

Total Length in Centimeters	Carp	Silver chub	Silver chub	Silver chub	Silver chub	Speckled chub	Emerald shiner	Emerald shiner	Emerald shiner
	Total	Spring	Summer	Fall	Total	Summer*	Spring	Summer	Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	1								
4.0 - 5.9	1					1	4	1	5
6.0 - 7.9	1						66	65	43
8.0 - 9.9		6	1		7		3	24	18
10.0 - 11.9		6	7		13			1	
12.0 - 13.9	2	1	15	1	17				
14.0 - 15.9	1		1		1				
16.0 - 17.9	1		1		1				
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9	2								
45.0 - 49.9	3								
50.0 - 54.9									
55.0 - 59.9	2								
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	2	7	0	9	0	335	227	224
Total unmeasured	1	2	7	0	9	0	335	227	224
Total measured	14	13	25	1	39	1	73	91	66
Grand total	15	15	32	1	48	1	408	318	290

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations - 1976

Total Length in Centimeters	Emerald shiner	River shiner	River shiner	River shiner	River shiner	Pugnose minnow	Spottail shiner	Spottail shiner	Spottail shiner
	Total	Spring	Summer	Fall	Total	Spring*	Spring	Summer	Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9							1		
4.0 - 5.9	10	1			1	1	41		
6.0 - 7.9	174	12	5	4	21		2	81	16
8.0 - 9.9	45	6	2	10	18		3	16	49
10.0 - 11.9	1			2	2			5	3
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	786	0	0	0	0	0	0	114	81
Total unmeasured	786	0	0	0	0	0	0	114	81
Total measured	230	19	7	16	42	1	47	102	68
Grand total	1016	19	7	16	42	1	47	216	149

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations - 1976

Total Length in Centimeters	Spottail shiner	Spotfin shiner	Spotfin shiner	Spotfin shiner	Spotfin shiner	Bullhead minnow	Bullhead minnow	Bullhead minnow	Bullhead minnow
	Total	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	1						8	3	11
4.0 - 5.9	41	10	7	4	21	31	23	23	77
6.0 - 7.9	99	14	22	3	39	12	11	16	39
8.0 - 9.9	65								
10.0 - 11.9	8								
12.0 - 13.9									
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	195	0	0	0	0	0	1	1	2
Total unmeasured	195	0	0	0	0	0	1	1	2
Total measured	217	24	29	7	60	43	42	42	127
Grand total	412	24	29	7	60	43	43	43	129

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Carp- sucker spp.	Carp- sucker spp.	Carp- sucker spp.	Carp- sucker spp.	Small- mouth buffalo	Small- mouth buffalo	Small- mouth buffalo	Small- mouth buffalo	Silver redhorse
	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total	Spring*
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9	1			1					
4.0 - 5.9	7			7	6			6	
6.0 - 7.9		2		2	1			1	
8.0 - 9.9					1	2		3	
10.0 - 11.9		3		3		5		5	
12.0 - 13.9		11	1	12		2		2	
14.0 - 15.9		6	5	11					
16.0 - 17.9			6	6					
18.0 - 19.9			1	1					
20.0 - 21.9							1	1	
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									1
34.0 - 35.9							1	1	
36.0 - 37.9									
38.0 - 39.9		1		1					
40.0 - 44.9		1		1					
45.0 - 49.9									
50.0 - 54.9									1
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	1	0	0	1	0
Total unmeasured	0	0	0	0	1	0	0	1	0
Total measured	8	24	13	45	8	9	2	19	2
Grand total	8	24	13	45	9	9	2	20	2

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Shorthead readhorse	Shorthead redhorse	Shorthead redhorse	Channel catfish	Channel catfish	Channel catfish	Channel catfish	Tadpole madtom	Trout perch
	Spring	Summer	Total	Spring	Summer	Fall	Total	Spring*	Spring*
Y/Y not meas.					10		10		
0.1 - 1.9									
2.0 - 3.9				1			1		1
4.0 - 5.9				5	7		12		2
6.0 - 7.9		2	2		11		11	1	
8.0 - 9.9		3	3		6		6	1	
10.0 - 11.9					7		7		
12.0 - 13.9				1	3		4		
14.0 - 15.9				1		1	2		
16.0 - 17.9				1		1	2		
18.0 - 19.9	1		1						
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9	1		1						
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9		1	1						
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	10	0	10	0	0
Total unmeasured	0	0	0	0	10	0	10	0	0
Total measured	2	6	8	9	34	2	45	2	3
Grand total	2	6	8	9	44	2	55	2	3

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	White bass	White bass	White bass	White bass	Bluegill	Bluegill	Bluegill	Bluegill	Hybrid sunfish
	Spring	Summer	Fall	Total	Spring	Summer	Fall	Total	Spring*
Y/Y not meas.	1065	429	1	1495			4	4	
0.1 - 1.9									
2.0 - 3.9	2			2	3	20	5	28	
4.0 - 5.9	97			97		17	30	47	2
6.0 - 7.9	50	3		53	1	12	16	29	
8.0 - 9.9		22	3	25	11		5	16	
10.0 - 11.9		73	9	82	3			3	
12.0 - 13.9		10	10	20		2		2	
14.0 - 15.9			5	5					
16.0 - 17.9	3		1	4					
18.0 - 19.9	2			2	1			1	
20.0 - 21.9		1		1					
22.0 - 23.9		1		1					
24.0 - 25.9									
26.0 - 27.9	1	1		2					
28.0 - 29.9	1	1		2					
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	1	0	0	1	0	0	0	0	0
Total unmeasured	1066	429	1	1496	0	0	4	4	0
Total measured	156	112	28	296	19	51	56	126	2
Grand total	1222	541	29	1792	19	51	60	130	2

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Small- mouth bass Spring	Small- mouth bass Summer	Small- mouth bass Fall	Small- mouth bass Total	Large- mouth bass Fall*	White crappie Spring	White crappie Summer	White crappie Total	Black crappie Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9						9		9	
4.0 - 5.9						19	1	20	2
6.0 - 7.9	1			1		1		1	
8.0 - 9.9							3	3	
10.0 - 11.9							1	1	1
12.0 - 13.9		1		1					2
14.0 - 15.9			1	1	1	1		1	
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	0
Total unmeasured	0	0	0	0	0	0	0	0	0
Total measured	1	1	1	3	1	30	5	35	5
Grand total	1	1	1	3	1	30	5	35	5

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Black crappie	Black crappie	Black crappie	Crappie spp.	Johnny darter	Johnny darter	Johnny darter	River darter	Yellow perch
	Summer	Fall	Total	Spring*	Spring	Summer	Total	Spring*	Spring
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9			2		1	1	2	1	16
6.0 - 7.9	2		2	6					5
8.0 - 9.9	3		3						
10.0 - 11.9	1	1	3						3
12.0 - 13.9			2						
14.0 - 15.9									
16.0 - 17.9									
18.0 - 19.9									
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	1	0	1	0	0
Total unmeasured	0	0	0	0	1	0	1	0	0
Total measured	6	1	12	6	1	1	2	1	24
Grand total	6	1	12	6	2	1	3	1	24

* This species was caught during only one season.

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Yellow perch Summer	Yellow perch Total	Log perch Spring	Log perch Summer	Log perch Fall	Log perch Total	Sauger Spring	Sauger Summer	Sauger Fall
Y/Y not meas.									
0.1 - 1.9									
2.0 - 3.9									
4.0 - 5.9		16	5			5			
6.0 - 7.9	1	6	3	3		5	2		
8.0 - 9.9	2	2	1	2		3	1		
10.0 - 11.9		3			3	3		5	
12.0 - 13.9	1	1						1	
14.0 - 15.9	1	1							1
16.0 - 17.9	1	1							
18.0 - 19.9	1	1					1		
20.0 - 21.9									
22.0 - 23.9									
24.0 - 25.9									
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	1	0	1	0	0	0
Total unmeasured	0	0	0	1	0	1	0	0	0
Total measured	7	31	9	5	3	17	4	6	1
Grand total	7	31	9	6	3	18	4	6	1

Table 2.5.2-21 Length-frequency of fishes caught by seining at all seining stations-1976

Total Length in Centimeters	Sauger Total	Walleye Spring	Walleye Summer	Walleye Total	Fresh- water drum Spring	Fresh- water drum Summer	Fresh- water drum Fall	Fresh- water drum Total	
Y/Y not meas.					229	9		238	
0.1 - 1.9									
2.0 - 3.9					6	2		8	
4.0 - 5.9		1		1	95	16		111	
6.0 - 7.9	2	2		2	30	13		43	
8.0 - 9.9	1	11	2	13	5	14		19	
10.0 - 11.9	5	1	1	2		20	1	21	
12.0 - 13.9	1		2	2		46		46	
14.0 - 15.9	1					8		8	
16.0 - 17.9							1	1	
18.0 - 19.9	1		1	1					
20.0 - 21.9									
22.0 - 23.9						1		1	
24.0 - 25.9						1		1	
26.0 - 27.9									
28.0 - 29.9									
30.0 - 31.9									
32.0 - 33.9									
34.0 - 35.9									
36.0 - 37.9									
38.0 - 39.9									
40.0 - 44.9									
45.0 - 49.9									
50.0 - 54.9									
55.0 - 59.9									
60.0 - 64.9									
65.0 - 69.9									
70.0 - 74.9									
75.0 - 79.9									
80.0 - 84.9									
85.0 - 89.9									
90.0 - 94.9									
95.0 - 99.9									
100.0 - +									
Others not meas.	0	0	0	0	0	0	0	0	
Total unmeasured	0	0	0	0	229	9	0	238	
Total measured	11	15	6	21	136	121	2	259	
Grand total	11	15	6	21	365	130	2	497	

Table 2.5.2-22 Total numbers and percentages of fish tagged and returned April 9, 1974 through January 7, 1977.

Species	Total No. tagged in 1976	Total No. tagged 1974 through 1976*	Total No. of tags returned Apr. 9, 1974 through Jan. 7, 1977	% returned of total tagged for each species
Northern pike	2	238	45	18.91
Carp	15	15	-	-
Smallmouth buffalo	4	4	-	-
Channel catfish	18	148	5	3.38
Flathead catfish	3	13	1	7.69
White bass	981	2,649	199	7.51
Smallmouth bass	18	94	7	7.45
Largemouth bass	3	19	3	15.79
Sauger	211	1,122	127	11.32
Walleye	347	1,037	99	9.55
TOTAL	1,602	5,339	486	9.10

* None of the fish included in this report were tagged after December 8, 1977.

Table 2.5.2-23 Age structure of the populations of selected species, 1976

Species	Age										Total	Collection Methods and Seasons
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+		
White bass												
Number	4	28	16	43	27	24	6	3	1	0	152	Fall trap netting
%	2.63	18.42	10.53	28.29	17.76	15.79	3.95	1.97	0.66	-	100.00	
Smallmouth bass												
Number	10	11	17	16	11	4	1	0	0	0	70	Summer and Fall electro-fishing
%	14.29	15.71	24.29	22.86	15.71	5.71	1.43	-	-	-	100.00	
Black crappie												
Number	0	15	84	19	24	7	1	0	0	0	150	Fall trap netting
%	-	10.00	56.00	12.67	16.00	4.67	0.67	-	-	-	100.01	
Sauger												
Number	1	2	11	12	2	3	2	2	1	0	36	Fall gill netting and electro-fishing
%	2.78	5.56	30.56	33.33	5.56	8.33	5.56	5.56	2.78	-	100.02	
Walleye												
Number	16	14	42	52	38	16	3	1	2	0	184	Summer, trap netting, gill netting, electro- fishing, seining, trawling Fall, trap netting gill netting, electro- fishing (no walleyes were collected by trawling or seining in the fall)
%	8.70	7.61	22.83	28.26	20.65	8.70	1.63	0.54	1.09	-	100.01	
Freshwater drum												
Number	24	48	4	20	21	22	6	7	4	2	158	Fall trap netting
%	15.19	30.38	2.53	12.66	13.29	13.92	3.80	4.43	2.53	1.27	100.00	

Table 2.5.2-24 Length-weight relationships for selected species in the Prairie Island vicinity, 1976 (All stations combined, summer and fall data separated)

Species	Summer, 1976				Fall, 1976			
	Equation	Correlation Coefficient	n		Equation	Correlation Coefficient	n	
Gizzard shad	$\log W = 3.060 \log L - 5.062$	0.992	49		$\log W = 3.153 \log L - 5.287$	0.988	248	
Northern pike	$\log W = 3.257 \log L - 5.977$	0.968	24		$\log W = 3.005 \log L - 5.190$	0.974	69	
Carp	$\log W = 2.787 \log L - 4.310$	0.974	232		$\log W = 2.956 \log L - 4.727$	0.920	404	
Shorthead redhorse	$\log W = 2.421 \log L - 3.462$	0.906	139		$\log W = 3.024 \log L - 4.967$	0.968	355	
Channel catfish	$\log W = 3.031 \log L - 5.094$	0.993	63		$\log W = 3.440 \log L - 6.128$	0.982	15	
White bass	$\log W = 2.600 \log L - 3.917$	0.958	355		$\log W = 3.135 \log L - 5.217$	0.972	613	
Rock bass	$\log W = 2.943 \log L - 4.501$	0.983	38		$\log W = 3.344 \log L - 5.371$	0.930	22	
Bluegill	$\log W = 2.230 \log L - 2.903$	0.877	120		$\log W = 2.584 \log L - 3.679$	0.981	262	
Smallmouth bass	$\log W = 2.894 \log L - 4.562$	0.995	52		$\log W = 3.105 \log L - 5.073$	0.984	33	
Black crappie	$\log W = 2.869 \log L - 4.475$	0.972	122		$\log W = 3.168 \log L - 5.154$	0.976	229	
Sauger	$\log W = 3.026 \log L - 5.138$	0.984	68		$\log W = 3.016 \log L - 5.082$	0.967	172	
Walleye	$\log W = 2.988 \log L - 5.010$	0.994	58		$\log W = 3.120 \log L - 5.331$	0.974	146	
Freshwater drum	$\log W = 2.815 \log L - 4.454$	0.993	202		$\log W = 2.989 \log L - 4.850$	0.984	418	

Table 2.5.2-25 Expected weights for fish of various lengths in the Prairie Island vicinity.

Length		Weight (g)		
mm.	in.	1973	1976 Summer	1976 Fall
<u>Gizzard Shad</u>				
100	3.9	10	11	9
150	5.9	36	39	38
200	7.9	90	95	93
300	11.8	318	330	334
350	13.8	516	528	543
<u>Northern Pike</u>				
200	7.9	73	34	53
300	11.8	218	123	179
400	15.8	475	315	426
500	19.7	869	651	833
600	23.6	1424	1179	1440
700	27.6	2161	1948	2280
800	31.5	3102	3009	3418
900	35.4	4267	4415	4869
<u>Carp</u>				
250	9.8	228	236	230
300	11.8	381	392	394
400	15.8	854	875	922
500	19.7	1598	1629	1783
600	23.6	2667	2708	3056
650	25.6	3339	3385	3872
<u>Shorthead redhorse</u>				
100	3.9	12	24	12
200	7.9	94	128	98
300	11.8	305	343	334
400	15.8	704	688	797
450	17.7	1027	915	1138

Table 2.5.2- 25 Expected weights for fish of various lengths in the Prairie Island vicinity (cont'd.)

<u>Length</u>			<u>Weight (g)</u>	
mm.	in.	1973	1976 Summer	1976 Fall
<u>Channel catfish</u>				
300	11.8	203	260	247
400	15.8	522	621	665
450	17.7	767	887	998
500	19.7	1084	1220	1434

Length mm.	in.	Weight (g)			
		1973	1975	1976 Summer	1976 Fall
<hr/>					
White bass					
150	5.9	60	48	55	40
200	7.9	131	110	116	99
250	9.8	240	211	208	200
300	11.8	394	359	334	353
380	15.0	747	714	617	742

<u>Smallmouth Bass</u>					
200	7.9	125	121	125	118
300	11.8	428	374	404	415
400	15.8	1020	829	929	1014

<u>Length</u>		<u>Weight (g)</u>		
<u>mm.</u>	<u>in.</u>	<u>1973</u>	<u>1976 Summer</u>	<u>1976 Fall</u>
<u>Rock bass</u>				
100	3.9	25	24	21
150	5.9	81	80	81
200	7.9	184	187	211

Table 2.5.2- 25 Expected weights for fish of various lengths in the Prairie Island Vicinity (cont'd.)

<u>Length</u>		<u>Weight (g)</u>		
<u>mm.</u>	<u>in.</u>	<u>1973</u>	<u>1976 Summer</u>	<u>1976 Fall</u>
<u>Black Crappie</u>				
75	3.0	17	8	6
100	3.9	18	18	15
150	5.9	59	59	54
200	7.9	134	134	136
250	9.8	254	254	277

<u>Length</u>		<u>Weight (g)</u>			
mm.	in.	1973	1975	1976 Summer	1976 Fall
<u>Sauger</u>					
200	7.9	71	67	67	72
300	11.8	250	241	208	225
400	15.8	611	600	544	583
500	19.7	1220	1220	1069	1143

Length		Weight (g)				
mm.	in.	1973	1974	1975	1976 Summer	1976 Fall
<u>Walleye</u>						
150	5.9	36	30	31	31	29
300	11.8	275	253	256	246	250
450	17.7	908	875	886	227	885
550	21.6	1640	1620	1640	1507	1656
650	25.6	2670	2700	2730	2483	2788

<u>Length</u>		<u>Weight (g)</u>		
<u>mm.</u>	<u>in.</u>	<u>1973</u>	<u>1976 Summer</u>	<u>1976 Fall</u>
<u>Freshwater drum</u>				
150	5.9	41	47	45
200	7.9	98	106	107
300	11.8	333	330	358
400	15.8	793	743	846

Table 2.5.2-26 Species commonly caught in each type of habitat during the discharge electro-fishing study*

Station Numbers	1, 3, 7	2, 4, 6	5
Habitat	Riprap	Mud bottom	Center-canal
Diversity (range)	1.49 - 2.18	0.88 - 1.23	0.68
Species	Occurrence**		
Gizzard shad	3	3	1
Carp	3	3	1
Emerald shiner	3	1	1
Bluegill	3	2	0
White bass	3	0	0
Rock bass	2	1	0
Walleye	2	1	0
Shorthead redhorse	0	2	0
Carp sucker	0	0	1
Smallmouth buffalo	0	1	0
Smallmouth bass	1	0	0
Sauger	0	1	0
Freshwater drum	1	0	0
Number of stations within each habitat	3	3	1

* Includes all 12 sampling dates and all temperature ranges. Most commonly caught species listed first.

** Number of stations in which a given species is considered "commonly caught."

Species common in all habitat types: gizzard shad, carp, emerald shiner

Species common only over riprap: white bass, smallmouth bass, freshwater drum

Species common only over mud substrate: smallmouth buffalo, shorthead redhorse, sauger.

Table 2.5.2-27 White bass population estimate calculations, 1976

Date	M_i	Mortality Since Previous Recapture	M_t	C_t	$C_t M_t$	$\Sigma(C_t M_t)$	R_t	$R = \Sigma R_t$	$N = \frac{\Sigma(C_t M_t)}{R+1}$
11- 1	72	0		72			0		
11- 2	103	0	72	103	7,416	7,416	0	0	7,416
11- 3	30	0	175	30	5,250	12,666	0	0	12,666
11- 4	59	0	205	63	12,915	25,581	4	4	5,166
11- 5	90	0	264	92	24,288	49,869	2	6	7,124
11-11	80	1	354	86	30,444	80,313	6	12	6,178
11-24	74	1	434	76	32,984	113,297	2	14	7,553
12- 3	50	1	508	55	27,940	141,237	5	19	7,062*
12- 8	17	1	525	17	8,925	150,162	0	19	7,508

* Final estimate - last sample in which marked fish were recaptured

At confidence coefficient of 0.95, the number of returns at 19 returns can be expected to vary between 11.5 and 29.6. With an estimate of 7,062, the range is 4616 - 11,299.

Table 2.5.2-28 Summary of results from the population estimates in
Stations 3-2 and 3-3

	Species		
	Carp	White bass	Walleye
Estimated Number	9,086	7,062	1,056
95% Conf. Interval	2,753-16,521	4,616-11,299	716-1,625
No./ha	1,442.2	1,121.0	167.6
Tot. Est. Weight(Kg)	14,446.5	2,231.5	777.0
Kg/ha	2,293.0	354.5	123.5

Table 2.5.2-29 Walleye population estimate calculations, 1976

Date	M_i	Mortality Since Previous Recapture	M_t	C_t	$C_t M_t$	$\Sigma(C_t M_t)$	R_t	$R = \Sigma R_t$	$N = \frac{\Sigma(C_t M_t)}{R+1}$
11- 1	64	0		64					
11- 2	22	0	64	23	1,472	1,472	1	1	736
11- 3	6	0	86	7	602	2,074	1	2	691
11- 4	36	0	94	38	3,572	5,646	2	4	1,129
11- 5	40	0	130	41	5,330	10,976	1	5	1,829
11-11	18	0	167	24	4,008	14,984	6	11	1,249
11-24	12	1	184	17	3,128	18,112	5	16	1,065
12- 3	20	1	195	25	4,875	22,987	5	21	1,045
12- 8	9	0	215	11	2,365	25,352	2	23	1,056*

* Final estimate

At a confidence coefficient of 0.95 the number of returns at 23 returns can be expected to vary between 14.6 and 34.4. With an estimate of 1,056, the range is 716 - 1,625.

Table 2.5.2-30 Carp population estimate calculations, 1976

Date	M_i	Mortality Since Previous Recapture	M_t	C_t	$C_t M_t$	$\Sigma(C_t M_t)$	R_t	$R = \Sigma R_t$	$N = \frac{\Sigma(C_t M_t)}{R+1}$
11- 1	46	0		46					
11- 2	10	0	46	10	460	460	0	0	
11- 3	5	0	56	5	280	740	0	0	
11- 4	22	0	61	22	1,342	2,082	0	0	
11- 5	10	0	83	10	830	2,912	0	0	
11-11	5	0	93	5	465	3,377	0	0	
11-19	17	0	98	17	1,666	5,043	0	0	
11-24	14	0	115	14	1,610	6,653	0	0	
12- 3	20	0	129	20	2,580	9,233	0	0	
12- 8	59	0	149	60	8,940	18,173	1	1	9,086*

* Final estimate

At confidence coefficient of 0.95 the number of returns at 1 return can be expected to vary between 0.1 and 5.6. With an estimate of 9,086 the range is 2,753 - 16,521.

Table 2.5.2-31 Numbers of summer and fall trap net sets and numbers of fall gill net sets used in abundance index calculations 1973 through 1976.

Year	Summer trap net	Fall trap net	Fall gill net	Total
1973	40	29	19	88
1974	40	40	25	105
1975	72	72	24	168
1976	65	69	24	158
Totals	217	210	92	519

Table 2.5.2- 32 Abundance indices for 12 fish species in the Prairie Island vicinity, 1973-1976.

Species	1973	1974	1975	1976
Shortnose gar	0.83	1.92*	0.77*	0.71*
Gizzard shad	1.18*	0.80*	1.61*	0.45*
Northern pike	1.29*	1.12	1.11	0.63*
Carp	0.92	1.33*	0.63*	1.25*
Shorthead redhorse	0.83	1.36*	0.36*	1.56*
White bass	0.78*	1.33*	0.66*	1.24*
Bluegill	0.78	1.59*	0.75	1.01
White crappie	0.15*	0.50*	0.60*	2.29*
Black crappie	0.52*	1.00	1.06	1.19*
Sauger	1.74*	0.98	1.01	0.52*
Walleye	1.64*	1.00	0.78	0.83
Freshwater drum	0.85*	0.91	0.36*	1.83*

* Significant difference between expected catch and observed catch shown by a chi-square test (95 percent level, d.f.=3).

Table 2.5.2-33 Diversity indices vs. temperature gradient at three stations in the discharge electro-fishing study, 1976

<u>Station No.</u>	<u>Date*</u>	<u>\bar{d}</u>	<u>Max. temp.</u>	<u>Min. temp.</u>	<u>(Max-min)</u>
1	8-13	0.000	28.5b***	28.0s**	0.5
1	8-19	0.000	29.0s	28.0b	1.0
1	7-22	1.485	29.5s	27.5b	2.0
3	7-22	1.722	29.0b	24.0b	5.0
3	8-13	1.993	28.5b	25.5b	3.0
7	8-19	2.587	28.8s	23.8b	5.0
3	8-19	2.829	29.5s	24.3b	5.2
7	7-22	3.001	30.5b	25.5b	5.0
7	8-13	3.093	29.5s	25.0s	4.5

* These three sampling dates had the highest mean surface temperatures recorded at these stations during the discharge electro-fishing study.

** s = surface temperature

*** b = bottom temperature

